Soil Survey Investigations Report No. 8

Soil Survey Laboratory Data and Descriptions for Some Soils of...

...WYOMING

SOIL CONSERVATION SERVICE · U.S. DEPARTMENT OF AGRICULTURE
In cooperation with
WYOMING AGRICULTURAL EXPERIMENT STATION

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      tr(s): trace, detectable only by qualitative procedure more sensitive than quantitative procedure used
      -- : analysis run but none detected
      -(s): none detected by sensitive qualitative test
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      nd: analysis not run
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PREFACE

This publication is one in a new U.S. Department of Agriculture series established to preserve and make available technical information resulting from soil survey investigations. These investigations have been going on for about two decades. Data from them have been distributed in unpublished form to those immediately concerned. Some of the data and descriptions have appeared in technical journals, in regional bulletins, in USDA technical bulletins, and in the text of published soil surveys. But most were not available to all who might use them.

We intend to publish in this series all data from the soil survey laboratories that form reasonably complete characterizations of soils. Already-assembled data and descriptions will be published just as rapidly as they can be prepared for printing. Fragmentary data collected as reference points for specific soil surveys will not be included.

While these data were being assembled, there were many changes in laboratory methods. Some were improved and some new ones were devised. Consequently, laboratory data for different soils cannot always be directly compared without allowance for the method.

The method used is indicated by symbol in the column headings of the data table. These symbols are identified in the code sheet on the opposite page. Each method is described in the first number of this series, "Soil Survey Laboratory Methods and Procedures for Collecting Soil Samples," SSIR No. 1.

Ways of describing soils have also changed. Soil descriptions have become explicit on more and more features. The systems for designating horizons and for classifying soils have been changed.

The soil descriptions published here were prepared as working documents to meet a specific need of a soil survey at the time the soil samples were collected. The soil scientists who wrote them had no idea they would be published. Editing has been limited for the most part to that necessary for conformance to the "Soil Survey Manual." Field textural estimates have been retained, even though some are at variance with the laboratory data, because the field estimates themselves are important data.

There were several reasons for sampling these soils. Some were sampled to study soil genesis, some to facilitate classification, and some to obtain data to permit more useful interpretations. Those sampled for genesis or classification studies do not always fit neatly into our present concepts of soil series. Partly because of these studies, our concepts of some soil series have been modified. As a consequence, the soil series name assigned a soil at the time of sampling is not always the name that would be assigned today. Soil series names in this publication follow 1965 series definitions.

Soil Survey
Soil Conservation Service

WYOMING

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	Keith	S53Wyo-8-3	39
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	Rosebud	S54Wyo-8-2	79
	Rosebud	S54Wyo-8-3	81
	Stoneham	S54Wyo-8-1	83
	Terry	S53Wyo-8-8	85
	Terry	S53Wyo-8-9	87
	Valentine	S50Wyo-8-6	93
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Platte	Fort Collins	S58Wyo-16-1	17
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	Fort Collins	S58Wyo-16-3	21
	Fort Collins	S58Wyo-16-5	23
	Fort Collins	S58Wyo-16-6	25
	Fort Collins	S58Wyo-16-7	27
	Fort Collins	S58Wyo-16-10	29
	Larimer	S58Wyo-16-4	51
	Larimer	S58Wyo-16-8	53
	Larimer	S58Wyo-16-9	55

[redacted]

Soil type: Arvada very fine sandy loam
Soil No.: 854Wyo-13-1
Location: Natrona County, Wyoming; 300 feet south and 150 feet east of northwest corner of Section 29, T33N, R81W.
Physiographic position: Sloping faces of old terrace levels now uplands.
Topography: Simple convex slope of approximately 5 percent facing west.
Drainage: Well drained.
Vegetation: Medium cover of western wheatgrass, blue grama grass, threadleaf sage, big sage, cactus and some mosses and lichens.
Use: Pasture.
Collected by: L. T. Alexander, James Allen, Harold Bindschadler, A. J. Cline, and Clarence Faulks, August 17, 1954.
Described by: A. J. Cline.

Horizon and Lincoln Lab. Number	
A2 2479	0 to 3 inches. White (10YR 8/1 dry) to grayish brown (10YR 5/2.5 moist) fine sandy loam; soft when dry, very friable when moist; weak coarse platy breaking to moderate fine granular; noncalcareous; lower boundary clear and smooth.
B2t 2480	3 to 9 inches. Grayish brown (10YR 5/2.5 dry) to dark grayish brown (10YR 4/2.5 moist) light silty clay; very hard when dry, very firm when moist; moderate medium columnar breaking to strong medium angular blocky; noncalcareous; structural aggregates have well rounded caps; clear moderately thick clay skins; lower boundary abrupt and smooth.
B3sa 2481	9 to 15 inches. Light yellowish brown (2.5Y 6/3 dry) to light olive brown (2.5Y 5/3 moist) heavy silty clay loam; very hard when dry, firm when moist; moderate coarse prismatic breaking to moderate coarse angular blocky; calcareous; the horizon contains a few small calcium carbonate concretions; lower boundary gradual and irregular.
C1sa 2482	15 to 23 inches. Light brownish gray (2.5Y 6/2 dry) to light olive brown (2.5Y 5/3 moist) light clay loam; very hard when dry, firm when moist; weak coarse angular blocky structure; calcareous; the horizon contains much calcium carbonate and other salts; calcium carbonate chiefly as lime flour but with a few concretions; lower boundary gradational and smooth.
C2sa 2483	23 to 30 inches. Light olive gray (5Y 6/2.5 dry) to olive gray (5Y 5/2.5 moist) light sandy clay loam; very hard when dry, firm when moist; massive to very weak coarse subangular blocky structure; calcareous; horizon contains much accumulated calcium carbonate and other salts; calcium carbonate chiefly as lime flour; there are a few concretions believed to be calcium sulphate in the lower part; lower boundary gradual and smooth.
C3sa 2484	30 to 41 inches plus. Pale olive (5Y 6/3 dry and moist) light sandy clay loam; very hard when dry, firm when moist; massive; calcareous; horizon contains some visible calcium carbonate and other salts but much less than the horizons above; this horizon consists principally of reworked clayey alluvium washed down the sides of old terrace levels.

SOIL SURVEY LABORATORY Mandan, N. Dak.

SOIL TYPE Colby loam **LOCATION** Goshen County, Wyoming

SOIL NOS. S50Wyo-8-2 **LAB. NOS.** 514-519

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1									2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 (<19mm)	
0-2	A11	0.6	0.6	0.7	4.2	44.1	38.8	11.0	74.0	12.1	-	1
2-4½	A12	-	0.8	1.0	3.2	36.9	42.7	15.4	65.5	16.4	-	1
4½-20	AC	-	-	1.2	2.4	37.9	46.0	12.5	69.5	15.9	-	1
20-34	C1ca	-	0.3	0.5	1.7	38.0	45.2	14.3	70.8	13.6	-	1
34-60	C2ca	-	-	0.3	1.4	39.9	44.5	13.9	72.6	12.8	-	1
a		0.7	5.7	7.4	16.2	31.2	21.2	17.6	54.9	7.7	1	vfsl

pH	ORGANIC MATTER	8A2	ELECTRI- CAL	6E1a	6F1a	MOISTURE TENSIONS

Soil type: Colby loam
Soil No.: S50Wyo-8-2
Location: Southeast quarter of northeast quarter of northeast quarter of Section 25, T24N, R62W, Goshen County, Wyo.
Vegetation: Moderately good cover of blue grama, threadleaf sedge, weeds and herbs; virgin.
Parent material: Probably Bignell or later loess.
Slope: Near crest of hill on 4 percent slope; hilly upland.
Described by: W. M. Johnson

Horizon and Mandan Lab. Number	
A11 514	0 to 2 inches. Light brownish gray (10YR 6/2.5 dry) to dark grayish brown (10YR 4/2 moist); very soft, very friable; very weak platy loam that breaks to weak fine granules; very mildly calcareous; strongly matted with grass roots.
A12 515	2 to 4½ inches. Pale brown (10YR 6/2.5 dry) to dark grayish brown (10YR 4/2.5 moist); very soft, very friable; very weak subangular blocky silt loam that crushes to weak fine granules; calcareous; matted with grass roots.
AC 516	4½ to 20 inches. Light yellowish brown (2.5Y 6.5/3 dry) to olive brown (2.5Y 4.5/4 moist) moderately prismatic; soft, friable; calcareous silt loam that crushes to weak granules.
C1ca 517	20 to 34 inches. Pale yellow (2.5Y 7/3 dry) to light olive brown (2.5Y 5/3 moist) weak prismatic; soft, friable; calcareous silt loam.
C2ca 518	34 to 60 inches. Pale brown (10YR 6.5/3 dry) to brown (10YR 5/3 moist); soft, friable; weak prismatic calcareous silt loam.

SOIL SURVEY LABORATORY Mandan, N. Dak.

SOIL TYPE Colby loam **LOCATION** Goshen County, Wyoming

SOIL NOS. S50Wyo-8-3 **LAB. NOS.** 520-526

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	3A1 2A2 > 2	TEXTURAL CLASS
0-3½	A11	-	0.8	0.7	3.8	30.0	43.6	21.1	60.5	15.7	-	1
3½-8	A12	-	0.4	0.6	4.1	29.7	39.6	25.6	58.4	14.2	-	1
8-19	B2	-	0.3	0.6	4.5	32.5	39.3	22.8	60.6	14.7	-	1
19-36	C1ca	-	0.2	0.2	2.1	27.3	52.3	17.9	57.5	23.7	-	sil
36-43	C2ca	-	-	0.6	3.1	36.0	52.3	8.0	70.6	19.9	-	sil
43-56	C3ca	-	-	0.1	3.3	43.4	42.0	11.2	73.7	14.1	-	1
a		0.9	8.0	7.6	11.2	22.9	31.5	17.9	49.4	11.4	-	1

	pH		ORGANIC MATTER			8A2	ELECTRICAL CONDUCTIVITY	6E1a	6F1a	MOISTURE TENSIONS		
8C1b SATURATED PASTE	8C1a 1:5	8C1a 1:10	6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	EST% SALT (BUREAU CUP)	EC×10³ MILLIMHOS PER CM 8A1a.	$CaCO_3$ equivalent %	GYPSUM me./100g. SOIL	1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
7.1	7.7	8.0	1.75	.143	12.2	-	0.4	-	-			11.8
7.3	7.9	8.1	1.07	.108	9.9	-	0.3	-	-			13.0
7.7	8.4	8.6	0.79	.088	9.0	-	0.4	-	-			12.4
8.2	9.1	9.2	0.48	.063	7.6	-	0.4	15	-			13.9
8.3	9.3	9.5	0.18	.026		-	1.0	10	-			9.8
8.1	9.1	9.3	0.14	.020		-	2.8	7	-			8.7
7.7	8.4	8.6	1.23	.120	10.2	-	0.6	-	-			9.6

5A1a	5B1a	CATIONS			5B1b	5D2	8A1	SATURATION EXTRACT SOLUBLE				8A
CATION EXCHANGE CAPACITY NH_4OAc	EXTRACTABLE 6N2b Ca	6O2b Mg	H	EXCHANGEABLE 6P2a Na	6Q2a K	EXCH. Na %	6P1a Na	6Q1a K				MOISTURE AT SATURATION %
← milliequivalents per 100g. soil →							← milliequivalents per liter →					
25.6	18.1	4.0		0.4	3.3	2	-	-				47.2
26.4	19.8	3.9		0.5	2.6	2	-	0.4				47.0

Soil type: Colby loam
Soil No.: S50Wyo-8-3
Location: Northeast quarter of southeast quarter of northwest quarter of Section 32, T24N, R61W, Goshen County, Wyo.
Vegetation: Virgin pasture; good cover of blue grama, threadleaf sedge, needlegrass, weeds and herbs.
Physiographic position: Nearly level, high terrace-like position.
Parent material: Apparently a late loess deposit on a rock terrace.
Described by: W. M. Johnson.

Horizon and Mandan Lab. Number	
A11 520	0 to 3½ inches. Light brownish gray (10YR 5.5/2 dry) to dark grayish brown (10YR 4/2 moist), soft, friable, weak coarse and medium granular loam; roots very numerous; noncalcareous; boundary indistinct.
A12 521	3½ to 8 inches. Grayish brown (10YR 5/2 dry) to dark grayish brown (10YR 4/2 moist) soft, friable, coarse silt loam; weak subangular blocks break to weak coarse granules; noncalcareous; grass roots numerous; indistinct boundary.
B2 522	8 to 19 inches. Light brownish gray (10YR 6/2.5 dry) to dark grayish brown (10YR 4/2 moist) slightly hard, friable, silt loam; weak prisms crush to weak coarse granules; noncalcareous; moderate number of grass roots; clear boundary.
C1ca 523	19 to 36 inches. White (10YR 8/2 dry) to pale brown (10YR 6/3 moist) slightly hard, friable, weak prismatic silt loam; strongly calcareous; few roots; gradual boundary.
C2ca 524	36 to 43 inches. White (10YR 8/2 dry) to pale brown (10YR 6/3 moist) massive, soft, friable, coarse silt loam; strongly calcareous; very few roots; diffuse boundary.
C3ca 525	43 to 56 inches. Light gray (10YR 7/2 dry) to light brownish gray (10YR 6/2.5 moist) massive, soft friable, coarse silt loam; strongly calcareous; very few roots.

SOIL SURVEY LABORATORY Mandan, North Dakota 9-8-55

SOIL TYPE *Creighton very fine sandy loam **LOCATION** Goshen County, Wyoming

SOIL NOS. S54Wyo-8-4 **LAB. NOS.** 2539-2545

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2 (<19mm)	TEXTURAL CLASS
0-2½	A1	0.3a	3.6	3.6	14.2	52.7	15.1	10.5	73.8	4.6	-	vfsl
2½-6	B1	0.5	4.6	3.4	12.4	54.4	15.6	9.1	73.8	5.9	-	vfsl
6-12½	B21t	1.2	5.4	3.6	13.5	49.7	13.6	13.0	69.2	4.6	1	vfsl
12½-17	B22t	0.4	3.3	3.0	12.7	48.7	19.7	12.2	70.2	7.9	-	vfsl
17-25	B3ca	0.3	2.5	3.2	12.9	48.7	20.7	11.7	71.2	8.2	-	vfsl
25-37	C1ca	0.2	3.7	4.5	14.7	47.6	18.9	10.4	71.3	6.1	-	vfsl
37-48	C2ca	2.2	13.6	9.4	19.0	35.4	10.2	10.2	55.0	3.7	4	vfsl

pH 8C1b SATURATED PASTE	pH 8C1a 1:5	pH 8C1a 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	ORGANIC MATTER 6B1a NITROGEN %	ORGANIC MATTER C/N	8A2 EST% SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC×10³ MILLIMHOS PER CM @25°C.	6E1a $CaCO_3$ equiv. %	GYPSUM me./100g. SOIL	MOISTURE TENSIONS 1/10 ATMOS. %	MOISTURE TENSIONS 1/3 ATMOS. %	4B2 15 ATMOS. %
6.7	7.1	7.2	1.43	.103	13.9	-		-				6.0

Soil type: *Creighton very fine sandy loam
Soil No.: S54Wyo-8-4
Location: Goshen County, Wyoming; near southeast corner of northeast quarter of southeast quarter of Section 19, T19N, R63W.
Physiographic position: Upland.
Topography: Gentle convex slope of approximately 3 percent facing northeast.
Drainage: Well drained.
Vegetation: Principally short grasses, grama, western wheatgrass and needlegrass.
Use: Pasture.
Collected by: James Allen, Charles Fox, E. F. Brunkow, and A. J. Cline, August 31, 1954.
Described by: A. J. Cline.

Horizon and Lincoln Lab. Number	
A1 2539	0 to 2½ inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) very fine sandy loam; soft when dry, very friable when moist; weak very fine granular structure; noncalcareous; lower boundary clear and smooth.
B1 2540	2½ to 6 inches. Grayish brown (10YR 5/2.5 dry) to very dark grayish brown (10YR 3/2 moist) very fine sandy loam; hard when dry, friable when moist; weak coarse subangular blocky structure; noncalcareous; lower boundary gradual and smooth.
B21t 2541	6 to 12½ inches. Grayish brown (10YR 5/2.5 dry) to very dark grayish brown (10YR 3/2 moist) heavy fine sandy loam; hard when dry, friable when moist; weak coarse prismatic breaking to weak coarse subangular blocky; noncalcareous; there are a few thin patchy clay skins; lower boundary gradual and smooth.
B22t 2542	12½ to 17 inches. Pale brown (10YR 6/3 dry) to dark grayish brown (10YR 4/2 moist) heavy fine sandy loam; hard when dry, friable when moist; weak very coarse prismatic breaking to weak coarse subangular blocky; noncalcareous; a few thin patchy clay skins; lower boundary abrupt and smooth.
B3ca 2543	17 to 25 inches. Very pale brown (10YR 7/3 dry) to brown (10YR 5/2.5 moist) fine sandy loam; slightly hard when dry, very friable when moist; massive to very weak coarse subangular blocky; calcareous; the horizon contains moderate amounts of accumulated lime principally as small concretions; lower boundary gradual and smooth.
C1ca 2544	25 to 37 inches. White (2.5Y 8/2 dry) to light yellowish brown (2.5Y 6/3 moist) light fine sandy loam; slightly hard when dry, very friable when moist; massive; calcareous; the horizon contains moderate amounts of accumulated calcium carbonate chiefly as lime flour; lower boundary gradual and smooth.
C2ca 2545	37 to 48 inches. White (2.5Y 8/2 dry) to light yellowish brown (2.5Y 6/3 moist) light fine sandy loam; slightly hard when dry, very friable when moist; massive; calcareous; the horizon contains moderate amounts of accumulated lime chiefly as lime flour but has somewhat less than the horizon above.

SOIL SURVEY LABORATORY Mandan, North Dakota 9-8-55

SOIL TYPE *Creighton **LOCATION** Goshen County, Wyoming

	1B1a	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1								2A2	

Soil type: *Creighton loamy fine sand
Soil No.: S54Wyo-8-5
Location: Goshen County, Wyoming; approximately southeast corner of southeast quarter of northwest quarter of Section 21, T19N, R64W.
Physiographic position: Upland.
Topography: Gentle convex slope approximately 4 percent facing south.
Drainage: Well drained.
Vegetation: Chiefly blue grama, some buffalograss, western wheatgrass and needlegrass.
Use: Pasture.
Collected by: James Allen, Charles Fox, E. F. Brunkow, and A. J. Cline, August 31, 1954.
Described by: A. J. Cline.

Horizon and Lincoln Lab. Number	
A1 2546	0 to 2 inches. Dark grayish brown (10YR 4/2 dry) to very dark grayish brown (10YR 3/2 moist) fine sandy loam; soft when dry, very friable when moist; weak very fine granular structure; noncalcareous; lower boundary clear and smooth.
B1 2547	2 to 5½ inches. Grayish brown (10YR 5/2.5 dry) to very dark grayish brown (10YR 3/2 moist) fine sandy loam; slightly hard when dry, friable when moist; weak medium subangular blocky structure; noncalcareous; lower boundary clear and smooth.
B21t 2548	5½ to 8½ inches. Dark grayish brown (10YR 4/2 dry) to very dark grayish brown (10YR 3/2 moist) heavy fine sandy loam; hard when dry, friable when moist; weak to moderate coarse prismatic breaking to weak to moderate coarse subangular blocky; noncalcareous; the horizon has a few thin patchy clay skins; lower boundary is gradational and smooth.
B22t 2549	8½ to 16 inches. Brown (10YR 5/2.5 dry) to dark brown (10YR 4/2.5 moist) heavy fine sandy loam; hard when dry, friable moist; weak to moderate coarse prismatic breaking to weak to moderate coarse subangular blocky; noncalcareous; lower boundary abrupt and smooth.
B3ca 2550	16 to 19 inches. Very pale brown (10YR 7/2.5 dry) to brown (10YR 5/2.5 moist) fine sandy loam; slightly hard when dry, friable when moist; weak coarse subangular blocky; calcareous; the horizon contains a few small calcium carbonate concretions; lower boundary is gradual and smooth.
C1ca 2551	19 to 26 inches. Pale yellow (2.5Y 8/3 dry) to light olive brown (2.5Y 5/3 moist) fine sandy loam; very hard when dry, firm when moist; massive; calcareous; the horizon contains large amounts of accumulated lime, principally as lime flour but with a few small concretions; lower boundary is gradational and irregular.
C2ca 2552	26 to 35 inches. Pale yellow (2.5Y 8/3 dry) to light olive brown (2.5Y 5/3 moist) light fine sandy loam; slightly hard when dry, friable when moist; massive; calcareous; the horizon contains moderate amounts of accumulated calcium carbonate chiefly as lime flour; lower boundary is gradational and irregular.
C3ca 2553	35 to 48 inches. Pale yellow (2.5Y 7/3 dry) to light olive brown (2.5Y 5/3 moist) light fine sandy loam; slightly hard when dry, very friable when moist; massive; calcareous; this horizon grades downward into fine grained Tertiary sandstone.

SOIL SURVEY LABORATORY Mandan, N. Dak.

SOIL TYPE Dunday loamy fine sand **LOCATION** Goshen County, Wyoming

SOIL NOS. S53Wyo-8-4 **LAB. NOS.** 1901-1906

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2	TEXTURAL CLASS
0-5½	A1p	2.5	10.4	9.2	26.8	33.3	9.3	8.5	59.4	2.2		lfs
5½-13	B21	3.7	12.9	12.4	23.7	25.9	10.5	10.9	47.6	3.8	Tr.	fsl
13-20½	B22	3.8	14.4	15.0	28.5	22.7	8.0	7.6	45.8	3.0	-	ls
20½-27	B3	3.0	11.7	16.2	36.0	23.7	4.4	5.0	49.9	1.6	Tr.	s
27-46	C1	2.0	16.2	20.8	35.9	18.5	3.2	3.4	41.9	1.6	-	s
46-60	C2	0.7	10.6	20.0	40.6	21.4	3.3	3.4	48.3	1.4	-	s

ORGANIC MATTER 8A2 ELECTRI... 6F1a 6F2a MOISTURE TENSIONS

Soil type: Dunday loamy fine sand
Soil No.: S53Wyo-8-4
Location: Goshen County, Wyoming; southwest corner of southwest quarter of northwest quarter of Section 20, T22N, R61W; about 550 feet northeast of west quarter corner; photo 12-32.
Slope: 2 percent upland slope; convex, faces south; well drained.
Vegetation: Cultivated; crested wheat.
Parent material: Eolian sands, probably mainly from Lance (cretaceous) sandstones.
Described by: C. J. Fox, September 24, 1953.

Horizon and Mandan Lab. Number

Alp 1901 — 0 to 5½ inches. Dark brown (10YR 4/3 dry) or dark grayish brown (10YR 4/2 moist) noncalcareous loamy fine sand with single grain and weak fine crumb structure; friable when moist, slightly hard when dry; roots abundant; clear smooth boundary.

B21 — 5½ to 13 inches.. Dark brown (10YR 4/3 dry) or very dark grayish brown (10YR 3/2 moist) noncalcareous

1902 — friable very coarse moderately developed prismatic fine sandy loam; crushes to single grains and fine weak granules; very hard when dry; many fine roots; gradual smooth boundary.

B22 1903 — 13 to 20½ inches. Brown (10YR 5/3 dry) or dark brown (10YR 4/3 moist) noncalcareous friable coarse weak prismatic fine sandy loam; crushes to single grains; many fine roots; gradual smooth boundary.

[redacted]

1904 — coherent loamy fine sand; some fine grass roots; gradual smooth boundary.

C1 1905 — 27 to 46 inches. Pale brown (10YR 6/3 dry) or brown (10YR 5/3 moist) moderately calcareous slightly coherent loamy fine sand; some fine roots; diffuse boundary.

C2 1906 — 46 to 60 inches. Very pale brown (10YR 7/3 dry) or brown (10YR 5/3 moist) moderately calcareous slightly coherent fine sand.

SOIL SURVEY LABORATORY Mandan, N. Dak.

SOIL TYPE Dwyer loamy fine sand **LOCATION** Goshen County, Wyoming

SOIL NOS. S53Wyo-8-6 **LAB. NOS.** 1914-1919

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1									2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 (<19mm)	
0-6	Ap	4.8	10.3	8.9	22.9	35.3	10.2	7.6	58.5	3.2	1	lfs
6-12	AC	3.5	9.3	10.0	26.8	33.4	9.9	7.1	59.2	2.8	Tr.	lfs
12-17	C1	2.2	8.5	9.9	28.2	34.3	10.1	6.8	61.1	3.3	Tr.	lfs

Soil type: Dwyer loamy fine sand
Soil No.: S53Wyo-8-6

[redacted]

feet north of road; photo 12-26.
Vegetation: Cultivated; wheat stubble.
Slope: 2 percent upland; convex, faces northeast; well drained.
Parent material: Eolian sands, derived largely from Lance sandstone (cretaceous).
Note: Profile dry when examined.
Described by: C. J. Fox, September 25, 1953.

Horizon and Mandan Lab. Number	
Ap 1914	0 to 6 inches. Brown (10YR 5/3 dry) or dark grayish brown (10YR 4/2 moist) slightly calcareous friable angular blocky loamy fine sand containing some quartzitic coarse sand and gravel; crushes to single grains and weak fine granules; hard when dry; many fine roots; abrupt smooth boundary.
AC 1915	6 to 12 inches. Dark grayish brown (10YR 4/2 dry) or very dark grayish brown (10YR 3/2 moist) non-calcareous friable very coarse weak prismatic fine sandy loam; breaks to medium moderately developed angular blocks that crush to single grains; some fine roots; clear smooth boundary.
C1 1916	12 to 17 inches. Brown (10YR 5/3 dry) or dark brown (10YR 4/3 moist) moderately calcareous friable medium weak angular blocky fine sandy loam; crushes to single grains; some fine roots; clear wavy boundary.
C2 1917	17 to 26 inches. Pale brown (10YR 6/3 dry) or brown (10YR 5/3 moist) strongly calcareous slightly coherent loamy fine sand containing an occasional quartz pebble; few fine roots; gradual wavy boundary.
C3 1918	26 to 44 inches. Pale brown (10YR 6/3 dry) or brown (10YR 5/3 moist) strongly calcareous slightly coherent single grained loamy fine sand; diffuse smooth boundary.
C4 1919	44 to 58 inches. Very pale brown (10YR 7/3 dry) or brown (10YR 5/3 moist) strongly calcareous single grained loamy fine sand which is only slightly coherent; abrupt smooth boundary.
IIR	58 inches plus. (Not sampled) Yellowish clay shale of Lance formation.

SOIL SURVEY LABORATORY Lincoln, Nebr. August 1959

SOIL TYPE Ft. Collins fine sandy loam LOCATION Platte County, Wyoming

SOIL NOS. S58Wyo-16-1 LAB. NOS. 9244-9253

1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1

Soil type: Ft. Collins fine sandy loam
Soil No.: S58Wyo-16-1
Location: Platte County, Wyoming; starting at corner fence post which is approximately 115 feet northeast of the southwest corner of section, then north along fence 849 feet and east 387 feet, in northwest quarter of southwest quarter of southwest quarter, Section 9, T24N, R67W.
Physiographic position: High terrace.
Topography: Nearly level, 1 percent slope, southeast aspect.
Drainage: Well drained.
Vegetation: Blue grama grass and cacti.
Use: Pasture.
Collected by: James Allen, Keith Young, A. J. Cline, and Fraser Stephens, October 7, 1958.
Described by: A. J. Cline and Fraser Stephens.

Horizon and Lincoln Iab. Number	
A11 9244	0 to 1 inch. Grayish brown (10YR 5/2 dry) to very dark grayish brown or dark grayish brown (10YR 3.5/2 moist) fine sandy loam; soft when dry, very friable when moist; weak very fine granular structure; noncalcareous; lower boundary abrupt and smooth.
A12 9245	1 to 3½ inches. Grayish brown or brown (10YR 5.5/2.5 dry) to dark grayish brown or dark brown (10YR 4/2.5 moist) loamy sand; soft when dry, very friable when moist; weak fine subangular blocky structure breaking to moderate very fine granules; noncalcareous; lower boundary clear and smooth.
AB 9246	3½ to 6 inches. Light brownish gray or pale brown (10YR 6/2.5 dry) to dark grayish brown or dark brown (10YR 4/2.5 moist) light sandy clay loam; hard when dry, friable when moist; very weak coarse prismatic structure breaking to weak coarse subangular blocks; noncalcareous; there are thin patchy clay skins on both the horizontal and vertical faces of the soil aggregates; lower boundary clear and smooth.
B2t 9247	6 to 11 inches. Light brownish gray or pale brown (10YR 6/2.5 dry) to dark grayish brown (10YR 4/2 moist) sandy clay loam; hard when dry, friable when moist; moderate medium prismatic structure breaking to moderate to strong medium subangular blocks; noncalcareous; there are thin nearly continuous clay skins on the surfaces of the soil aggregates; lower boundary clear and wavy.
B3ca 9248	11 to 16 inches. Light brownish gray (1.25Y 6/2 dry) to grayish brown (1.25Y 5/2.5 moist) light clay loam; hard when dry, friable when moist; very weak medium prismatic structure breaking to weak to moderate medium and fine subangular blocks; violently calcareous; there are a few thin patchy clay skins on both the horizontal and vertical faces of the soil aggregates; this is a weak to moderate horizon of lime accumulation with visible lime occurring as concretions and in finely divided forms; lower boundary gradual and wavy.
Cca1 9249	16 to 26 inches. Light gray (2.5Y 7/2 dry) to light olive brown (2.5Y 5/3 moist) light clay loam; very hard when dry, firm when moist; very weak medium subangular blocky structure; violently calcareous; this is a strong horizon of lime accumulation with visible lime occuring in finely divided forms; there are moderate number of insect casts approximately one-half inch in diameter; lower boundary diffuse and smooth.
Cca2 9250	26 to 36 inches. Light brownish gray (2.5Y 6/2 dry) to grayish brown (2.5Y 5/2 moist) fine sandy clay loam; hard when dry, friable when moist; weak medium subangular blocky structure; violently calcareous; this is a moderate horizon of lime accumulation with visible lime occuring mostly in divided forms; there are many insect casts approximately one-half inch in diameter; lower boundary gradual and wavy.
B2b 9251	36 to 43 inches. Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist) fine sandy clay loam; hard when dry, friable when moist; weak coarse prismatic structure breaking to weak to moderate coarse and medium subangular blocks; calcareous with the inside of the aggregates being less calcareous than their surface; there are a few insect casts in this horizon; there are also a few thin patchy clay skins on both the horizontal and vertical faces of the soil aggregates; lower boundary clear and wavy.
B3cab 9252	43 to 50 inches. Light gray (10YR 7/2 dry) to pale brown (10YR 6/3 moist) sandy loam; slightly hard when dry, very friable when moist; massive; violently calcareous; lower boundary clear and smooth.
Cca 9253	50 to 62 inches. White (10YR 8/2 dry) to very pale brown (10YR 7/3 moist) sandy loam; very hard when dry, friable when moist; massive; violently calcareous; this is a strong horizon of lime accumulation with visible lime occurring in finely divided forms; lower boundary gradual and smooth.
D	62 inches plus. Sand and gravel with little fine material; this horizon contains some accumulated lime but less than in the horizon above and mainly as coatings on the surfaces of sand and gravel. Rocks in this horizon are principally granitic rocks but there is a small percentage of metamorphic rock as well. This horizon not sampled for laboratory study.

SOIL SURVEY LABORATORY Lincoln, Nebr. August 1959

SOIL TYPE Ft. Collins fine sandy loam **LOCATION** Platte County, Wyoming

SOIL NOS. S58Wyo-16-2 **LAB. NOS.** 9254-9263

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 1B1a									2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 (<19mm)	
0-1½	A11	1.5	8.0	9.4	22.3	29.8	17.8	11.2	57.1	5.7	Tr.	fsl/vfsl
1½-3	A12	2.1	13.5	14.4	29.2	24.5	10.1	6.2	50.2	3.5	3	ls
3-5	AB	1.0	7.5	11.6	28.6	26.3	11.3	13.7	52.3	4.7	7	fsl

Soil type: Ft. Collins fine sandy loam
Soil No.: S58Wyo-16-2
Location: Platte County, Wyoming; starting at southeast corner of section, then north 1184 feet and west 266 feet in northeast quarter of southeast quarter of southeast quarter of Section 13, T24N, R68W.
Physiographic position: High terrace.
Topography: Nearly level, 1 percent slope, northeast aspect.
Drainage: Well drained.
Vegetation: Blue grama grass, buffalograss, fringe sagewort, green sagewort, and wild buckwheat.
Use: Pasture.
Collected by: James Allen, Keith Young, A. J. Cline, and R. C. Kronenberger, October 7, 1958.
Described by: A. J. Cline and Fraser Stephens.

Horizon and Lincoln Lab. Number	
A11 9254	0 to 1½ inches. Light brownish gray (10YR 6/2 dry) to dark grayish brown (10YR 4/2 moist) fine sandy loam; soft when dry, very friable when moist; moderate very fine granular structure; noncalcareous; lower boundary clear and smooth; horizon temperature 26.5 degrees centigrade.
A12 9255	1½ to 3 inches. Light brownish gray or pale brown (10YR 6/2.5 dry) to dark grayish brown or dark brown (10YR 4/2.5 moist) loamy sand; soft when dry, very friable when moist; very weak medium subangular blocky structure breaking to very weak fine granules or single grains; noncalcareous; lower boundary clear and wavy. Temperature of this horizon 27.0 degrees centigrade.

SOIL SURVEY LABORATORY Lincoln, Nebr. August 1959

SOIL TYPE Ft. Collins fine sandy loam **LOCATION** Platte County, Wyoming

SOIL NOS. S58Wyo-16-3 **LAB. NOS.** 9264-9268

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)								3A1	2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 (<19mm)	
0-9	Ap	4.4	11.9	11.2	24.1	18.4	14.0	16.0	40.6	6.0	8	fsl
9-15	B2t	1.0	6.2	7.6	17.2	15.9	25.9	26.2	40.0	12.0	Tr.	scl
15-24	B3ca	2.0a	5.2a	6.3a	18.2a	18.8a	26.0	23.5	45.2	10.9	20	scl
24-28	Cca1	7.3b	10.5b	9.3b	19.6b	12.3b	15.5	25.5	29.3	9.1	25	scl
28-44	Cca2	9.1c	10.5c	10.5c	20.5c	12.6c	14.4	22.4	29.9	8.5	27	scl

Soil type: Ft. Collins fine sandy loam
Soil No.: S58Wyo-16-3
Location: Platte County, Wyoming; southwest quarter of northwest quarter of northeast quarter of Section 16, T24N, R68W; beginning at east end of metal culvert in concrete-lined irrigation ditch near north quarter corner of section, then east 695 feet and south 971 feet.
Physiographic position: High terrace.
Topography: Nearly level; 1/2 percent slope, north aspect.
Drainage: Well drained.
Vegetation: Cultivated.
Use: Irrigated cropland; 1958 dry beans.
Collected by: James Allen, Keith Young, A. J. Cline and R. C. Kronenberger, October 7, 1958.
Described by: A. J. Cline and Fraser Stephens.

Horizon and Lincoln Lab. Number	
Ap 9264	0 to 9 inches. Grayish brown or light brownish gray (10YR 5.5/2 dry) to very dark grayish brown or dark grayish brown (10YR 3.5/2 moist) fine sandy loam; slightly hard when dry, very friable when moist; weak medium and fine subangular blocky structure breaking to weak very fine granules; noncalcareous; temperature 18.5 degrees centigrade; lower boundary abrupt and smooth.
B2t 9265	9 to 15 inches. Brown or pale brown (10YR 5.5/3 dry) to brown or dark brown (10YR 4/3 moist) sandy clay loam; hard when dry, friable when moist; moderate medium prismatic structure breaking to moderate medium subangular blocks; noncalcareous; there are thin continuous clay skins on the surfaces of the soil aggregates; temperature 16.5 degrees centigrade; lower boundary clear and smooth.
B3ca 9266	15 to 24 inches. Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist) sandy clay loam; hard when dry, friable when moist; weak to moderate medium subangular blocky structure; strongly calcareous; this is a weak horizon of lime accumulation with some visible lime occurring as small concretions; there are thin patchy clay skins on both the horizontal and vertical faces of the soil aggregates; horizon temperature 15.5 degrees centigrade; there is some coarse gravel in the lower part of this horizon; lower boundary gradual and smooth.
Ccal 9267	24 to 28 inches. Pale yellow (2.5Y 7/3 dry) to light yellowish brown (2.5Y 6/3 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; massive; violently calcareous; approximately 10 percent of this horizon is stone and gravel; this is a moderate to strong horizon of lime accumulation with visible lime occurring as concretions and in finely divided forms; horizon temperature 15.5 degrees centigrade; lower boundary diffuse and wavy.
Cca2 9268	28 to 44 inches. White (2.5Y 8/2 dry) to pale yellow (2.5Y 7/3 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; massive; violently calcareous; this is a strong horizon of lime accumulation with visible lime occurring in finely divided forms; approximately 15 percent of this horizon is stone and gravel; horizon temperature 15.5 degrees centigrade; this horizon grades to substratum of clean sand, gravel, and cobble.

Note: Samples taken 3:25 p.m. October 7 with an air temperature of 21.5 degrees centigrade.

SOIL SURVEY LABORATORY Lincoln, Nebr. August 1959

SOIL TYPE Ft. Collins fine sandy loam **LOCATION** Platte County, Wyoming

SOIL NOS. S58Wyo-16-5 **LAB. NOS.** 9274-9282

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2 (<19mm)	TEXTURAL CLASS
0-8	Ap	1.5	6.4	10.3	23.7	24.1	16.0	18.0	50.2	5.4	6	fsl
8-12	B21t	0.4a	3.3a	6.2a	14.7a	21.8a	29.2	24.4	50.8	10.0	Tr.	l
12-17	B22t	0.2a	1.4a	2.6a	9.2a	22.1a	37.7	26.8	51.9	14.0	Tr.	l/cl
17-27	B3ca	<0.1	0.8a	1.8a	7.7a	23.9a	40.6	25.2	56.0	13.9	Tr.	l
27-35	Cca1	0.1a	1.0a	2.2a	11.9a	28.0a	35.6	21.2	60.5	11.5	Tr.	l
35-43	Cca2	0.9a	5.3a	8.1a	31.6a	27.9a	14.9	11.3	58.9	4.5	Tr.	fsl
43-46	Alb	0.7a	2.9a	4.6a	18.3a	29.0a	28.3	16.2	60.4	9.0	11	vfsl
46-52	Cca3	4.8b	8.3b	10.1b	24.5b	19.1b	15.3	17.9	41.6	6.7	21	fsl
52-65	Cca4	13.4b	13.1b	9.3b	17.9b	11.4b	11.4	23.5	25.4	7.1	27	scl

	pH 8C1a		ORGANIC MATTER			8A2	ELECTRICAL CONDUCTIVITY 6E1a			MOISTURE TENSIONS		
			6A1a	6B1a								4B2
1:1	1:5	1:10	ORGANIC CARBON %	NITROGEN %	C/N	EST% SALT (BUREAU CUP)	EC×10³ MILLIMHOS PER CM 8A1a	$CaCO_3$ equivalent %	GYPSUM me./100g. SOIL	1/10 ATMOS. %	1/3 ATMOS. %	15 ATMOS. %
7.9	8.2	8.4	0.97	0.104	9	<0.20	0.9	<1				7.6
7.8	8.4	8.6	0.70	0.081	9	<0.20	0.6	1				10.0
8.2	8.7	8.9	0.51	0.064	8	<0.20	0.7	13				9.9
8.2	8.7	9.0	0.37	0.047	8	<0.20	0.6	12				8.6
8.2	8.8	9.0	0.22			<0.20	0.6	10				7.5
8.4	9.0	9.2	0.10			<0.20	0.5	3				4.1
8.3	9.0	9.2	0.15			<0.20	0.6	6				5.7
8.3	9.0	9.2	0.15			<0.20	0.7	16				6.6
8.4	9.0	9.2	0.11			<0.20	0.8	23				7.0

5A1a	EXTRACTABLE CATIONS 5B1a					5D2	SAT. EXT. SOL. 8A1		4B4	4A1a	8A
	6N2b	6O2b	6H1a	6P2a	6Q2a		6P1a	6Q1a			
CATION EXCHANGE CAPACITY NH_4Ac	Ca	Mg	H	Na	K	EXCH. Na %	Na	K	Field State Water %	Bulk Density g/cc	MOISTURE AT SATURATION %
← milliequivalents per 100g. soil →							← me/liter →				
15.4	14.8	3.7	0.8	0.2	0.7	1	1.6	0.4			33.0
18.5		5.3	<0.1	0.3	0.4	1	1.3	0.1	12.4	1.58	66.6

Soil type: Ft. Collins fine sandy loam
Soil No.: S58Wyo-16-5
Location: Platte County, Wyoming; northeast quarter of northwest quarter of northwest quarter of Section 17, T24N, R67W; beginning at northwest corner (center of crossroads), then 714 feet east and 366 feet south.
Physiographic position: High terrace.
Topography: Nearly level; 1/2 percent slope, north aspect.
Drainage: Well drained.
Vegetation: Cultivated. **Use:** Irrigated cropland; 1958 dry beans.
Collected by: James Allen, Keith Young, A. J. Cline, and R. C. Kronenberger, October 8, 1958.
Described by: A. J. Cline and Fraser Stephens.

Horizon and Lincoln Lab. Number	
Ap 9274	0 to 8 inches. Grayish brown (10YR 5/2 dry) to dark grayish brown (10YR 4/2 moist) fine sandy loam; slightly hard when dry, very friable when moist; weak medium subangular blocky structure breaking to moderate very fine granules; noncalcareous; horizon temperature 16 degrees centigrade; lower boundary clear and smooth.
B21t 9275	8 to 12 inches. Grayish brown or light brownish gray (10YR 5.5/2 dry) to dark grayish brown or grayish brown (10YR 4.5/2 moist) sandy clay loam or light clay loam; very hard when dry, firm when moist; very weak medium prismatic structure breaking to moderate medium subangular blocks; noncalcareous; there are thin nearly continuous clay skins on the surfaces of the soil aggregates; horizon temperature 15.5 degrees centigrade; lower boundary clear and smooth.
B22t 9276	12 to 17 inches. Light brownish gray (2.5Y 6/2 dry) to grayish brown (2.5Y 5/2 moist) light clay loam; hard when dry, friable when moist; moderate medium subangular blocky structure; strongly calcareous; this is a weak horizon of lime accumulation with some visible lime occurring as concretions or in thin seams and streaks; there are thin patchy clay skins on both the horizontal and vertical faces of the soil aggregates; horizon temperature 15.5 degrees centigrade; lower boundary gradual and smooth.
B3ca 9277	17 to 27 inches. Light brownish gray or light gray (2.5Y 6.5/2 dry) to grayish brown or light brownish gray (2.5Y 5.5/2 moist) light fine sandy clay loam; hard when dry, very friable when moist; weak to moderate medium and fine subangular blocky structure; violently calcareous; this is a moderate horizon of lime accumulation with visible lime occurring as concretions and in thin seams and streaks; there are thin patchy clay skins on both the horizontal and vertical faces of the soil aggregates; horizon temperature 16.0 degrees centigrade; lower boundary gradual and smooth.
Cca1 9278	27 to 35 inches. Light brownish gray or light gray (2.5Y 6.5/2 dry) to grayish brown or light brownish gray (2.5Y 5.5/2 moist) fine sandy clay loam; hard when dry, very friable when moist; very weak medium subangular blocky structure; violently calcareous; this is a moderate horizon of lime accumulation with visible lime occurring as concretions and in finely divided forms; horizon temperature 16 degrees centigrade; lower boundary gradual and smooth.
Cca2 9279	35 to 43 inches. Light yellowish brown or pale yellow (2.5Y 6.5/3 dry) to light olive brown or light yellowish brown (2.5Y 5.5/3 moist) sandy loam; slightly hard when dry, very friable when moist; massive; violently calcareous; this is a weak horizon of lime accumulations with visible lime occurring mostly as concretions; horizon temperature 16 degrees centigrade; lower boundary clear and smooth.
A1b 9280	43 to 46 inches. Light yellowish brown or pale yellow (2.5Y 6.5/3 dry) to light olive brown or light yellowish brown (2.5Y 5.5/3 moist) sandy loam; slightly hard when dry, very friable when moist; massive; strongly calcareous; this is a very weak horizon of lime accumulation and contains only an occasional concretion; there is an appreciable difference in lime between this horizon and the horizon which lies above and below it; horizon temperature 16 degrees centigrade; lower boundary clear and smooth.
Cca3 9281	46 to 52 inches. White (2.5Y 8/2 dry) to pale yellow (2.5Y 7/3 moist) gravelly sandy loam; slightly hard when dry, very friable when moist; massive; violently calcareous; this is a strong horizon of lime accumulation with visible lime occurring in divided forms; approximately 10 percent of this horizon is gravel and cobble which are concentrated in the surface inches; horizon temperature 17 degrees centigrade; lower boundary clear and wavy.
Cca4 9282	52 to 65 inches. Pale yellow (2.5Y 7/3 dry) to light yellowish brown (2.5Y 6/3 moist) gravelly sandy clay loam; slightly hard when dry, very friable when moist; massive; violently calcareous; this is a strong horizon of lime accumulation with visible lime occurring in finely divided forms; approximately 20 percent of this horizon is gravel and cobble; horizon temperature 17 degrees centigrade; this grades into clean gravel, sand, and cobble.

Note: Air temperature at the time of sampling 18 degrees centigrade. There will probably be some differences of opinion regarding the horizon designation to place on the 43- to 46-inch horizon; my decision to call this a buried A1 horizon stems principally from the lack of lime in this horizon as compared to both the horizons above and those below. It would seem to me that a strong concentration of lime such as we find below this horizon probably represents accumulation during a reasonable time of stability prior to the deposition of the overlying layers; this decision is of course open to question.

OIL SURVEY LABORATORY Lincoln, Nebr. August 1959

SOIL TYPE Ft. Collins sandy clay loam **LOCATION** Platte County, Wyoming

SOIL NOS. 858Wyo-16-6 **LAB. NOS.** 9283-9289

PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1

DEPTH INCHES	HORIZON	1B1a VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2 <19mm	TEXTURAL CLASS
0-7	Ap1	1.2	5.1	7.9	23.0	19.2	18.7	24.9	44.7	7.0	5	scl
7-11	Ap2	1.4	4.9	8.0	18.9	18.0	22.3	26.5	44.0	8.5	6	scl
11-16	B2t	0.6	3.2	5.5	12.5	17.5	33.1	27.6	47.2	11.6	Tr.	cl
16-28	B3ca	0.1	1.1	2.4	9.2	22.8	39.4	25.0	54.6	14.2	Tr.	l
28-33	Cca1	1.2	2.3	3.2	10.6	24.7	36.4	21.6	56.3	12.3	5	l
33-38	Cca2	9.7a	12.1a	10.8a	18.7a	13.0a	14.3	21.4	31.2	7.0	22	scl
38-44	Cca3	22.5a	18.8a	10.5a	12.7a	7.6a	10.8	17.1	19.5	5.8	30	cosl

	pH	8C1a	ORGANIC MATTER 6A1a	6B1a		8A2	ELECTRICAL CONDUCTIVITY 6A1a	6E1a		MOISTURE TENSIONS		4B2
						EST% SALT (BUREAU CUP)	EC x 10³ MILLIMHOS PER CM	$CaCO_3$ equivalent	GYPSUM me./100g. SOIL	1/10 ATMOS.	1/3 ATMOS.	15 ATMOS.
1:1	1:5	1:10	ORGANIC CARBON %	NITROGEN %	C/N			%		%	%	%
7.4	7.9	8.1	0.74	0.075	10	<0.20	0.4	<1				9.5
7.5	7.9	7.9	0.72	0.075	10	<0.20	0.4	<1				10.4
7.6	8.2	8.4	0.59	0.067	9	<0.20	0.5	<1				11.0
8.2	8.8	9.1	0.32	0.039	8	<0.20	0.4	12				8.3
8.3	9.0	9.2	0.22			<0.20	0.5	9				7.5
8.5	9.1	9.3	0.22			<0.20	0.6	20				6.5
8.7	9.2	9.4	0.24			<0.20	0.7	24				6.1

5A1a	EXTRACTABLE CATIONS 5B1a					5D2	SAT. EXT. SOL. 8A1			4B4	4A1a	8A
CATION EXCHANGE CAPACITY NH_4Ac	6N2b Ca	6G2b Mg	6H1a H	6P2a Na	6Q2a K	EXCH. Na %	6P1a Na	6Q1a K		Field State Water %	Bulk Density g/cc	MOISTURE AT SATURATION %
← milliequivalents per 100g. soil →							← me/liter →					
18.0	13.0	5.1	1.6	<0.1	1.0	<1	0.2	0.3				44.8
18.9	14.1	5.5	1.2	<0.1	0.8	<1	0.2	0.2		8.7	1.64	48.2
21.6	19.9	7.0	0.4	0.1	0.5	<1	0.3	0.1		11.3	1.56	53.7
14.4		9.2	<0.1	0.1	0.3	1	0.5	0.1				48.0
13.5		7.8	<0.1	0.1	0.3	1	0.8	0.1				47.1
7.9		6.3	<0.1	0.2	0.2	2	1.2	0.1				37.4
5.6		6.0	<0.1	0.2	0.1	2	2.2	0.1				34.6

a. Few $CaCO_3$ concr.

Soil type: Ft. Collins sandy clay loam
Soil No.: 858Wyo-16-6
Location: Platte County, Wyoming; northeast quarter of southwest quarter of northwest quarter of Section 19, T24N, R67W; beginning at center of wooden culvert on No. 1 canal (which is approximately 600 feet east of west quarter corner of section) then east 557 feet and north 711 feet.
Physiographic position: High terrace.
Topography: Nearly level; 1 percent slope, southeast aspect.
Drainage: Well drained.
Vegetation: Cultivated.
Use: Dry cropland; 1958 winter wheat.
Collected by: James Allen, Keith Young, A. J. Cline, R. C. Kronenberger, and Fraser Stephens, October 8, 1958.
Described by: A. J. Cline and Fraser Stephens.

Horizon and Lincoln Lab. Number	
Ap1 9283	0 to 7 inches. Grayish brown or brown (10YR 5/2.5 dry) to dark grayish brown or dark brown (10YR 4/2.5 moist) sandy clay loam; hard when dry, very friable when moist; weak medium subangular blocky structure breaking to moderate fine granules; noncalcareous; horizon temperature 16.5 degrees centigrade; lower boundary clear and smooth.
Ap2 9284	7 to 11 inches. Grayish brown or brown (10YR 5/2.5 dry) to dark grayish brown or dark brown (10YR 4/2.5 moist) sandy clay loam; very hard when dry, firm when moist; very weak coarse prismatic structure breaking to moderate medium and coarse subangular blocks; noncalcareous; there are thin patchy clay skins on both the horizontal and vertical faces of the soil aggregates; horizon temperature 17.5 degrees
B2t 9285	11 to 16 inches. Grayish brown or brown (10YR 5/2.5 dry) to dark grayish brown or dark brown (10YR 4/2.5 moist) clay loam; very hard when dry, firm when moist; moderate medium and fine prismatic structure breaking to moderate to strong fine subangular blocks; noncalcareous; there are thin continuous clay skins on the surfaces of the soil aggregates; horizon temperature 17 degrees centigrade; lower boundary clear and wavy.
B3ca	16 to 28 inches. Light yellowish brown or pale yellow (2.5Y 6.5/3 dry) to light olive brown (2.5Y 5/3

SOIL SURVEY LABORATORY Lincoln, Nebr. August 1959

SOIL TYPE Ft. Collins sandy clay loam **LOCATION** Platte County, Wyoming

SOIL NOS. S58Wyo-16-7 **LAB. NOS.** 9290-9295

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1								2A2	TEXTURAL CLASS
		VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY		> 2	

Soil type: Ft. Collins sandy clay loam
Soil No.: S58Wyo-16-7
Location: Platte County, Wyoming; northwest quarter of southwest quarter of southwest quarter of Section 16, T23N, R68W; beginning at southwest corner (center of crossroads), then north 1094 feet and east 550 feet.
Physiographic position: High terrace.
Topography: Gently sloping; 2 percent slope, southeast aspect.
Drainage: Well drained.
Vegetation: Cultivated.
Use: Irrigated cropland; 1958 oats.
Collected by: James Allen, Keith Young, A. J. Cline, R. C. Kronenberger, and Fraser Stephens, October 8, 1958.
Described by: A. J. Cline and Fraser Stephens.

Horizon and Lincoln Lab. Number	
Ap 9290	0 to 6 inches. Brown or pale brown (10YR 5.5/3 dry) to dark grayish brown or dark brown (10YR 4/2.5 moist) sandy clay loam; very hard when dry, very friable when moist; weak coarse subangular blocky structure breaking to moderate very fine granules; noncalcareous; horizon temperature 18.5 degrees centigrade; there are thin patchy clay skins on both the horizontal and vertical faces of most of the soil aggregates; lower boundary abrupt and smooth.
B2t 9291	6 to 9½ inches. Brown (10YR 5/3 dry) to dark grayish brown or dark brown (10YR 4/2.5 moist) sandy clay loam; very hard when dry, firm when moist; moderate medium prismatic structure breaking to moderate medium subangular blocks; noncalcareous; there are thin nearly continuous clay skins on the surfaces of the soil aggregates; horizon temperature 16.5 degrees centigrade; lower boundary clear and wavy.
B3ca 9292	9½ to 17 inches. Pale yellow (2.5Y 7/3 dry) to light olive brown (2.5Y 5/3 moist) sandy clay loam; hard when dry, friable when moist; moderate medium subangular blocky structure; this is a moderate to strong horizon of lime accumulation with visible lime occurring as concretions and in finely divided forms; there are a few thin patchy clay skins principally on the vertical faces of the soil aggregates; horizon temperature 16 degrees centigrade; lower boundary gradual and smooth.
Cca 9293	17 to 30 inches. Light yellowish brown (2.5Y 6/3 dry) to olive brown or light olive brown (2.5Y 4.5/3 moist) heavy sandy loam; hard when dry, very friable when moist; massive or very weak medium subangular blocky structure; violently calcareous; this is a weak to moderate horizon of lime accumulation with visible lime occurring as concretions and in thin seams and streaks; horizon temperature 16 degrees centigrade; lower boundary gradual and smooth.
C1 9294	30 to 50 inches. Light yellowish brown (2.5Y 6/3 dry) to light olive brown (2.5Y 5/3 moist) sandy loam; slightly hard when dry, very friable when moist; massive; violently calcareous; this is a weak horizon of lime accumulation with visible lime occurring mostly as concretions; horizon temperature 16.5 degrees centigrade; lower boundary gradual and wavy.
D 9295	50 to 60 inches plus. Pale yellow (2.5Y 7/3 dry) to light yellowish brown (2.5Y 6/3 moist) gravelly or cobbly loamy sand; loose when dry or moist; single grained; this horizon contains a few large soft concretions of lime several inches in diameter and intermixed with less limy material; approximately 70 percent of this horizon is gravel and cobble.

Note: Air temperature at the time of sampling 17.5 degrees centigrade.

SOIL SURVEY LABORATORY Lincoln, Nebr. August 1959

SOIL TYPE Ft. Collins very fine sandy loam **LOCATION** Platte County, Wyoming

SOIL NOS. S58Wyo-16-10 **LAB. NOS.** 9306-9312

DEPTH		1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)							3A1	2A2	
		VERY				VERY					

Soil type: Ft. Collins very fine sandy loam
Soil No.: S58Wyo-16-10
Location: Platte County, Wyoming; northeast quarter of southeast quarter of southwest quarter of Section 14, T26N, R68W; starting at north end of metal culvert (approximately 300 feet north of south "Y" of Dwyer Junction on east side of U. S. Highway 87), then west 52 feet to west side of pavement, northwest along edge of highway 974 feet, southwest at right angle to U. S. Highway 87 for 235 feet.
Physiographic position: High terrace.
Topography: Nearly level to very gently undulating; 0 to 1 percent slopes.
Drainage: Well drained.
Vegetation: Cultivated.
Use: Dry cropland; 1958 winter wheat.
Collected by: James Allen, Keith Young, A. J. Cline, R. C. Kronenberger, Harold Bindschadler, Norman Stinnette, Pat Shields, and Fraser Stephens, October 9, 1958.
Described by: A. J. Cline and Fraser Stephens.

Horizon and Lincoln Lab. Number	
Ap 9306	0 to 3½ inches. Light gray or light grayish brown (10YR 6/1.5 dry) to dark gray or dark grayish brown (10YR 4/1.5 moist) very fine sandy loam; soft when dry, very friable when moist; weak medium subangular blocky structure breaking to moderate very fine granules; noncalcareous; lower boundary clear and smooth.
[illegible]	[illegible]

SOIL SURVEY LABORATORY Mandan, N. Dak.

Soil type: Glenberg very fine sandy loam
Soil No.: S52Wyo-8-2
Location: Goshen County, Wyoming; northeast corner of southwest quarter of northeast quarter of southeast quarter of Section 5, T25N, R61W; photo 12-49.
Vegetation: Cultivated.
Slope: Nearly level bench about 8 feet above flood plain of North Platte River.
Described by: C. J. Fox, October 1952.

Horizon and Mandan Lab. Number	
Alp 1238	0 to 3½ inches. Brown (10YR 5/3 dry) to dark brown (10YR 4/3 moist) weak crumb-structured friable very fine sandy loam; noncalcareous; clear boundary.
[illegible]	[illegible]
1239	sandy loam; noncalcareous; friable; gradual boundary.
A13 1240	10½ to 13 inches. Brown (10YR 5/3 dry) to dark grayish brown (10YR 4/2 moist) friable fine sandy loam with weak fine crumb structure and containing an occasional quartz pebble; noncalcareous; gradual boundary.
A14 1241	13 to 21 inches. Pale brown (10YR 6/3 dry) to dark brown (10YR 4/3 moist) fine crumb-structured fine sandy loam containing an occasional quartz gravel; friable; slightly calcareous; clear boundary.
A1b 1242	21 to 30 inches. Brown (10YR 5/3 dry) to dark grayish brown (10YR 4/2 moist) friable weak fine granular fine sandy loam; occasional worm casts; moderately calcareous; clear boundary.
B2b 1243	30 to 38 inches. Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist) weak fine granular loam; very strongly calcareous; boundary between this layer and following layer is wavy.
Cca-b 1244	38 to 42 inches. Light gray (10YR 7/2 dry) to brown (10YR 5/3 moist) weak fine granular silt loam with distinct common mottlings of grayish brown (10YR 5/2 moist); friable; strongly calcareous; abrupt boundary.
Cu-1 1245	42 to 49 inches. Pale brown (10YR 6/3 dry) to dark grayish brown (10YR 4/2 moist) weak fine granular fine sandy loam; strongly calcareous; friable; clear boundary.
Cu-2 1246	49 to 61 inches. Light yellowish brown (10YR 6/4 dry) to yellowish brown (10YR 5/4 moist) loamy fine sand with single grain and weak fine granular structure; strongly calcareous; nearly loose; gradual boundary.
Cu-3 1247	61 inches plus. Light yellowish brown (10YR 6/4 dry) to yellowish brown (10YR 5/4 moist) weak fine granular fine sandy loam stratified with layers of grayish brown (10YR 5/2 moist) silty clay; silty clay layers have occasional reddish brown fine mottlings; strongly calcareous.

SOIL SURVEY LABORATORY Mandan, North Dakota 9/19/55

SOIL TYPE *Griffy sandy clay loam **LOCATION** Fremont County, Wyoming

SOIL NOS. S54Wyo-7-3 **LAB. NOS.** 2506-2512

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2 <19mm	TEXTURAL CLASS
0-2	A1	0.5	4.2	8.4	15.1	22.1	35.5	14.2	52.6	13.0	-	l
2-5	B21t	0.7	5.9	11.9	17.2	14.6	25.0	24.7	36.9	11.0	1	scl
5-10	B22t	0.8	5.4	12.8	21.4	15.1	23.1	21.4	38.9	10.2	-	scl
10-17	B3ca	0.5	7.1	15.5	26.0	13.9	18.4	18.6	37.1	8.2	-	fsl
17-24	C1ca	1.0	8.8	19.8	32.5	12.8	10.9	14.2	34.9	5.3	Tr.	fsl
24-30	C2ca	1.9	10.1	21.4	32.9	10.6	8.9	14.2	30.0	5.3	1	fsl
30-37	IIC3ca	1.4	11.4	20.6	29.4	10.4	9.6	17.2	28.2	5.8	1	sl

	pH		ORGANIC MATTER			8A2	ELECTRICAL CONDUCTIVITY	6E1a		MOISTURE TENSIONS		
8C1b SATURATED PASTE	8C1a 1:5	8C1a 1:10	6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	EST% SALT (BUREAU CUP)	EC×10³ MILLIMHOS PER CM 8A1a	$CaCO_3$ equivalent %	GYPSUM me./100g. SOIL	1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
7.5	7.9	7.7	0.62	.061	10.2	-	0.7	-				6.0
7.2	7.3	7.1	0.57	.060	9.5	-	0.5	-				9.3
7.4	8.1	8.2	0.42	.045	9.3	-	0.7	-				8.6
7.9	8.6	8.6	0.36	.038	9.5	-	0.6	3				7.8
8.0	8.9	8.8	0.28			-	0.7	4				5.9
8.2	9.3	9.3	0.22			-	0.8	5				5.6
8.2	9.3	9.3	0.16			-	1.0	10				6.2

5A1a	EXTRACTABLE CATIONS 5B1a					5D2	8A1 SATURATION EXTRACT SOLUBLE					8A
CATION EXCHANGE CAPACITY (NH_4Ac)	6N2b Ca	6O2b Mg	H	6P2a Na	6Q2a K	EXCH. Na %	6P1a Na	6Q1a K				MOISTURE AT SATURATION %
← milliequivalents per 100g. soil →							← milliequivalents per liter →					
14.3	10.8	3.9		0.2	0.8	1	0.4	0.2				32.2
23.8	17.4	6.5		0.3	0.3	1	0.4	-				41.0
21.2				0.2	0.2	1	0.7	-				38.8
16.3				0.4	0.2	2	1.4	-				38.8
12.3				0.6	0.1	4	2.6	-				32.4
11.3				0.9	0.2	6	4.9	-				34.2
10.8				1.2	0.2	9	6.9	-				32.6

Soil type: *Griffy sandy clay loam
Soil No.: 854Wyo-7-3
Location: Fremont County, Wyoming; approximately 0.4 mile northeast of junction of U.S. 26 and Paradise Valley Road, near southeast corner northeast quarter of Section 12, T1N, R3E.
Physiographic position: An old Pleistocene high terrace.
Topography: Nearly level to very gently undulating with slopes of 1/2 to 1 percent.
Vegetation: Approximately 60 percent cover of sagebrush, short grasses, predominantly blue grama, western wheatgrass and needlegrass, cactus and sedges.
Drainage: Well drained.
Use: Pasture.
Collected by: L. T. Alexander, James Allen, Harold Bindschadler, Clarence Faulks, and A. J. Cline, August 19, 1954.
Described by: A. J. Cline.

Horizon and Lincoln Lab. Number	
A1 2506	0 to 2 inches. Light gray (10YR 7/2 dry) to dark grayish brown (10YR 4/2 moist) loam; soft when dry, very friable when moist; weak coarse platy breaking to moderate very fine granular; the upper 1/16-

broken; noncalcareous; lower boundary abrupt and smooth; there are a few small pebbles scattered on the surface of this location.

B21t 2507	2 to 5 inches. Brown (10YR 5/3 dry) to dark grayish brown (10YR 4/2.5 moist) light sandy clay loam; slightly hard when dry, very friable when moist; weak coarse columnar breaking to moderate coarse platy; platy structure is easily seen in this horizon but the coarse columns with slightly rounded tops are the primary structure; noncalcareous; there are a few very weak and very thin patchy clay skins visible under the hand lens; the horizon contains some fine gravel.
B22t 2508	5 to 10 inches. Brown (10YR 5/3 dry) to dark grayish brown (10YR 4/2.5 moist) light sandy clay loam; very hard when dry, very firm when moist; moderate coarse columnar breaking to moderate coarse angular blocky; the tops of the aggregates in this horizon are slightly rounded. This structure most easily seen when the horizon above has been brushed away; a few weak clay skins; noncalcareous; lower boundary abrupt and smooth.
B3ca 2509	10 to 17 inches. Very pale brown (10YR 7/3 dry) to brown (10YR 5/3 moist) heavy fine sandy loam; very hard when dry, very firm when moist; weak coarse angular blocky structure; calcareous; the horizon contains some small calcium carbonate concretions; lower boundary gradual and smooth; contains a few small gravels.
C1ca 2510	17 to 24 inches. Light gray (2.5Y 7/2 dry) to light olive brown (2.5Y 5/3 moist) fine sandy loam; very hard when dry, very firm when moist; massive to very weak very coarse subangular blocky structure; calcareous; the horizon contains much accumulated lime principally as lime flour; lower boundary gradual and smooth; horizon contains a few small gravel fragments.
C2ca 2511	24 to 30 inches. Pale yellow (2.5Y 7/3 dry) to light olive brown (2.5Y 5/3 moist) fine sandy loam; very hard when dry, firm when moist; massive; calcareous; the horizon contains much accumulated lime principally as lime flour; lower boundary clear and smooth; the horizon contains moderate amounts of gravel.
IIC3ca 2512	30 to 37 inches. White (2.5Y 8/2 dry) to light yellowish brown (2.5Y 6/3 moist) gravelly and cobbly fine sandy loam; hard to slightly hard when dry; friable to loose when moist; massive to single grain; calcareous; the horizon contains moderate amounts of accumulated lime chiefly as lime flour.

SOIL SURVEY LABORATORY Mandan, North Dakota 9/19/55

SOIL TYPE *Griffy loam **LOCATION** Fremont County, Wyoming

SOIL NOS. S54Wyo-7-4 **LAB. NOS.** 2513-2519

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1									2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 (<19mm)	
0-2	A1	1.8	6.3	8.5	15.3	26.6	29.7	11.8	54.0	10.8	1	vfsl
2-5	B21t	1.0	5.7	7.7	13.6	20.9	32.2	18.9	45.7	14.8	Tr.	l
5-10½	B22tca	0.9	5.7	9.0	16.7	20.9	24.6	22.2	44.9	9.5	Tr.	scl
10½-18	B23tca	1.5	7.4	11.9	21.5	16.7	21.6	19.4	41.1	8.2	1	fsl
18-25	B3ca	2.3	10.9	17.1	27.5	12.4	15.1	14.7	34.8	6.1	Tr.	sl
25-36	C1ca	2.9	12.6	18.5	34.3	10.6	8.4	12.7	31.8	4.7	Tr.	fsl
36+	IIC2ca	4.0	15.6	19.6	34.4	9.6	6.4	10.4	29.6	3.9	-	ls

Soil type: *Griffy loam
Soil No.: S54Wyo-7-4
Location: Fremont County, Wyoming; 0.1 mile southeast, 0.2 mile west of bend in the Burma Road near the center of Section 28, T2N, R4E.
Physiographic position: An old high terrace level well above the present flood plains and terraces.
Topography: Nearly level to very gently undulating slopes of 0 to 1 percent.
Drainage: Well drained.
Vegetation: Approximately 50 to 60 percent cover of sagebrush and some scattered short grasses, sage and needlegrass.
Use: Pasture.
Collected by: L. T. Alexander, James Allen, Harold Bindschadler, Clarence Faulks, and A. J. Cline, August 18, 1954.
Described by: A. J. Cline.

Horizon and Lincoln Lab. Number	
A1 2513	0 to 2 inches. Light gray (10YR 7/2 dry) to grayish brown (10YR 5/2 moist) fine sandy loam; soft when dry, very friable when moist; weak medium platy breaking to moderate very fine granular; the upper 1/8- to 1/16-inch forms a very fragile thin crust; noncalcareous; lower boundary abrupt and smooth.
B21t 2514	2 to 5 inches. Pale brown (10YR 6/3 dry) to brown (10YR 4/2.5 moist) loam; slightly hard when dry, very friable when moist; weak coarse columnar breaking to moderate medium platy; secondary platy structure is pronounced in this horizon although the initial form is that of a column with a slightly rounded cap; noncalcareous; lower boundary abrupt and wavy.
B22tca 2515	5 to 10½ inches. Pale brown (10YR 6/3 dry) to brown (10YR 4/2.5 moist) heavy loam or light clay loam; very hard when dry, firm when moist; moderate coarse columnar breaking to moderate coarse angular blocky or in some instances a very coarse plate an inch or two inches on a side but with their vertical axis shorter than their horizontal; calcareous; the horizon contains moderate amounts of calcium carbonate concretions; a few very thin clay skins; lower boundary abrupt and smooth.
B23tca 2516	10½ to 18 inches. Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist) sandy clay loam; very hard when dry, firm when moist; weak to moderate coarse prismatic breaking to moderate coarse angular blocky; calcareous; horizon contains moderate amounts of accumulated lime partly as lime flour and partly as concretions; there are a few thin patchy clay skins; lower boundary gradual and smooth.

SOIL SURVEY LABORATORY Mandan, N. Dak.

SOIL TYPE Haverson loam LOCATION Goshen County, Wyoming

SOIL NOS. S50Wyo-8-7 LAB. NOS. 547-553

Soil type: Haverson loam
Soil No.: S50Wyo-8-7
Location: Southwest quarter of southeast quarter of southeast quarter of Section 10, T24N, R61W, Goshen County, Wyo.
Vegetation: Irrigated and cultivated field on a nearly level low terrace; soil does not seem to be disturbed by levelling at this site.
Described by: W. M. Johnson.

Horizon and Mandan Lab. Number

A1 547 — 0 to 4 inches. Light brownish gray (10YR 6/2 dry) to dark grayish brown (10YR 4/2 moist) soft, friable, weak coarse and medium granular loam containing a few 1/2-inch pebbles; moderately calcareous.

C1 548 — 4 to 13 inches. Soft, friable, weak irregular blocky loam of the same color as the surface horizon; contains a little very coarse sand and a few small pebbles; strongly calcareous.

C2ca 549 — 13 to 26 inches. Light brownish gray (10YR 6/2 dry) to dark grayish brown (10YR 4/2 moist) containing many faint, very pale brown mottles; slightly hard, friable, weak irregular blocky silt loam; very strongly calcareous; gradual boundary.

C3ca 550 — 26 to 31 inches. Very pale brown (10YR 8/3 dry, 7/3 moist) with many fine faint light gray mottles, soft, friable, weak irregular blocky silt loam; very strongly calcareous; gradual boundary.

C4ca 551 — 31 to 38 inches. Very pale brown (10YR 7/2.5 dry) to pale brown (10YR 6/3 moist) soft, friable, massive, gritty loam and silt loam; very strongly calcareous; gradual boundary.

C5ca 552 — 38 to 52 inches. Light brownish gray (10YR 6/1.5 dry) to grayish brown (10YR 5/2 moist) with common distinct mottles of white, hard friable massive slightly gritty silt loam; very strongly calcareous; gradual boundary.

C6ca 553 — 52 to 66 inches. Light brownish gray (10YR 6.5/2 dry) to dark grayish brown (10YR 4/2 moist) with very fine distinct white mottles, slightly hard, friable, massive loam; very strongly calcareous; abrupt boundary.

SOIL SURVEY LABORATORY Mandan, N. Dak.

SOIL TYPE Keith very fine sandy loam **LOCATION** Goshen County, Wyoming

SOIL NOS. S53Wyo-8-3 **LAB. NOS.** 1895-1900

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2	TEXTURAL CLASS
0-5	Ap	0.3	1.4	2.8	9.5	39.8	27.0	19.2	63.5	9.8	-	vfsl
5-11	B1	0.2	0.6	1.3	6.0	37.8	34.3	19.8	63.9	12.6	-	l
11-16	B21t	-	-	1.6	6.3	38.6	28.8	25.7	60.5	10.5	-	l
16-26	B22t	-	0.3	0.8	4.1	36.8	34.5	23.5	60.3	14.1	-	l
26-43	C1ca	-	-	0.4	1.4	25.2	49.6	23.4	54.3	21.5	-	l
43-60	C2ca	-	0.3	1.1	5.1	37.2	41.0	15.3	67.4	14.4	-	l

pH 8C1b SATURATED PASTE	8C1a 1:5	8C1a 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	NITROGEN %	C/N	8A2 EST% SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC×10³ MILLIMHOS PER CM 8A1a	6E1a $CaCO_3$ equivalent %	6F1a GYPSUM me./100g. SOIL	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
7.6	8.1	8.4	1.04			<0.20	0.9	1				12.9
7.5	8.0	8.3	1.12			<0.20	0.8	1				11.3
7.6	8.1	8.3	0.73			<0.20	0.8	-	-			12.5
7.7	8.3	8.6	0.56			<0.20	1.0	3	-			13.2
7.7	8.5	8.8	0.36			<0.20	1.1	17	-			14.1
7.8	8.7	8.9	0.09			<0.20	1.0	9	-			9.4

5A1a CATION EXCHANGE CAPACITY NH_4OAc	5B1a EXTRACTABLE CATIONS Ca	602b Mg	H	5B1b EXCHANGEABLE CATIONS 6P2a Na	6Q2a K	5D2 EXCH. Na %	8A1 SATURATION EXTRACT SOLUBLE 6P1a Na	6Q1a K	8A MOISTURE AT SATURATION %
	← milliequivalents per 100g. soil →						← milliequivalents per liter →		
20.9		3.0		0.3	2.3	1	1.7	1.2	39.0
23.2		3.3		0.3	2.2	1	1.5	1.0	44.1
24.5		3.4		0.3	1.9	1	1.7	0.6	49.8
23.8		5.6		0.4	2.2	2	2.0	1.0	48.5
21.1		8.2		0.4	2.8	2	1.5	1.6	48.5
19.3		7.5		0.6	2.8	3	2.3	1.6	38.5

Soil type: Keith very fine sandy loam
Soil No.: S53Wyo-8-3

Vegetation: Cultivated; irrigated bean field.
Slope: 1 percent or less; nearly level upland; well drained.
Parent material: Peorian or younger loess.
Described by: C. J. Fox, September 24, 1953.

Horizon and Mandan Lab. Number	
Ap 1895	0 to 5 inches. Grayish brown (10YR 5/2 dry) or very dark grayish brown (10YR 3/2 moist) noncalcareous friable single grained very fine sandy loam; many fine bean roots; abrupt smooth boundary.
B1 1896	5 to 11 inches. Grayish brown (10YR 5/2 dry) or very dark grayish brown (10YR 3/2 moist) noncalcareous friable crumb and single grained loam; some roots; clear smooth boundary.
B21t 1897	11 to 16 inches. Dark brown (10YR 4/3 dry) or very dark grayish brown (10YR 3/2 moist) weak medium prismatic angular blocky friable silt loam; very weakly calcareous; crushes to single grains and fine weak granules; clear wavy boundary.
B22t 1898	16 to 26 inches. Brown (10YR 5/3 dry) or very dark grayish brown (10YR 3/2 moist) coarse weak prismatic friable heavy silt loam; breaks to medium moderately developed angular blocky units that crush to weak fine granules; larger structural units thinly coated with darker material; soil is noncalcareous

SOIL SURVEY LABORATORY Mandan, N. Dak.

SOIL TYPE Keota silt loam **LOCATION** Goshen County, Wyoming

SOIL NOS. S50Wyo-8-1 **LAB. NOS.** 508-513

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2	TEXTURAL CLASS
0-3	A1	1.5	2.9	1.8	5.2	18.9	58.4	11.3	52.9	28.2	-	sil
3-6½	AC	1.4	3.7	2.2	6.4	20.4	56.1	9.8	53.2	27.5	-	sil
6½-9	C1ca	0.6	2.0	1.5	5.1	25.4	53.8	11.6	57.9	24.7	-	sil
9-25	C2ca	2.6	4.0	2.2	5.1	22.5	51.2	12.4	51.7	25.5	-	sil
25-37	C3ca	2.5	4.3	2.3	5.1	20.8	53.2	11.8	50.8	26.9	-	sil
a		1.2	3.1	4.3	11.1	29.2	37.1	14.0	57.2	16.0	-	l

pH 8C1b SATURATED	pH 8C1a	pH 8C1a	ORGANIC MATTER 6A1a ORGANIC	ORGANIC MATTER 6B1a NITRO-	8A2 EST% SALT (BUREAU	ELECTRICAL CONDUCTIVITY EC x 10³	6E1a $CaCO_3$ equiv.	6F1a GYPSUM me./100g.	MOISTURE TENSIONS 1/10	1/3	4B2 15

Soil type: Keota silt loam
Soil No.: S50Wyo-8-1
Location: Northwest quarter of southeast quarter of northwest quarter of Section 14, T24N, R62W, Goshen County, Wyo.
Vegetation: Virgin; good cover of blue grama grass and threadleaf sedge, some needlegrass (Stipa), sagebrush and cactus.
Slope: About 3 percent slope toward the north.
Described by: W. M. Johnson.

Horizon and Mandan Lab. Number	
A1 508	0 to 3 inches. Light brownish gray (10YR 6/2 dry) to dark grayish brown (10YR 4/2 moist) with numerous specks and small spots of light gray; soft, friable; very weak fine subangular blocky silt loam that breaks to weak fine granules; calcareous.
AC 509	3 to 6½ inches. Light brownish gray (10YR 6.5/2 dry) to grayish brown (10YR 5/2.5 moist) with numerous white spots; soft, friable; weak prismatic silt loam that breaks to weak irregular blocks that in turn crush to weak granules; calcareous; grass roots very numerous; white spots are due to small particles of weathered Brule siltstone.
C1ca 510	6½ to 9 inches. Light brownish gray (10YR 6/2 dry) to dark grayish brown (10YR 4/2 moist) with white to pale brown specks and small spots; friable; moderate prismatic silt loam that breaks to weak blocks and crushes to weak granules; calcareous; grass roots numerous.
C2ca 511	9 to 25 inches. Soft friable calcareous silt loam of the same color and structure as the horizon above; compact in place; contains numerous small fragments of Brule siltstone; grass roots moderately numerous.
C3ca 512	25 to 37 inches. Very weak granular, very soft, very friable; calcareous silt loam that is nearly loose in place; same speckled color as horizon above; contains numerous tiny fragments of Brule siltstone; few roots.

SOIL SURVEY LABORATORY Mandan, N. Dak.

SOIL TYPE Keota loam **LOCATION** Goshen County, Wyoming

SOIL NOS. S53Wyo-8-1 **LAB. NOS.** 1884-1889

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2	TEXTURAL CLASS
0-2½	Ap	2.0	2.9	2.4	7.9	28.8	40.7	15.3	57.3	17.4	Tr.	1
2½-5½	AC	1.8	2.7	2.2	6.6	27.3	43.2	16.2	56.1	18.7	-	1
5½-11	C1	1.7	2.7	2.0	5.9	25.7	44.4	17.6	53.0	20.9	-	1
11-17	C2	2.1	2.7	1.9	6.1	26.9	43.3	17.0	53.4	20.8	-	1
17-22	C3	1.5	2.7	1.9	5.9	26.2	45.2	16.6	54.0	21.2	-	1
22-32	C4	1.9	3.0	2.1	5.4	23.5	47.2	16.9	51.9	22.4	-	1

8C1b SATURATED PASTE	pH 8C1a 1:5	8C1a 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	NITROGEN %	C/N	8A2 EST% SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC×10³ MILLIMHOS PER CM 8A1a	6E1a $CaCO_3$ equivalent %	6F1a GYPSUM me./100g. SOIL	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
7.8	8.2	8.5	1.27			<0.20	0.8	8				12.1
7.7	8.1	8.4	1.01			<0.20	0.6	8				13.1
7.6	8.1	8.5	0.73			<0.20	0.6	11	-			14.0
7.7	8.3	8.5	0.69			<0.20	0.6	11	-			14.0
7.7	8.2	8.5	0.63			<0.20	0.6	12	-			13.8
7.7	8.3	8.6	0.56			<0.20	0.6	14	-			14.0

5A1a CATION EXCHANGE CAPACITY NH_4OAc	5B1a CATIONS EXTRACTABLE Ca	602b Mg	H	5B1b EXCHANGEABLE 6P2a Na	6Q2a K	5D2 EXCH. Na %	8A1 SATURATION EXTRACT SOLUBLE 6P1a Na	6Q1a K	8A MOISTURE AT SATURATION %
←	milliequivalents per 100g. soil →						← milliequivalents per liter →		
23.4		2.5		-	3.0	-	0.3	1.2	44.4
24.0		2.6		-	2.2	-	0.3	0.6	45.6
24.2		2.8		0.2	1.7	1	0.3	0.4	48.5
24.7		3.4		0.2	1.8	1	0.3	0.4	47.2
24.3		3.9		0.2	2.0	1	0.6	0.4	47.1
24.5		5.1		0.5	2.0	2	1.7	0.4	48.3

Soil type: Keota loam
Soil No.: S53Wyo-8-1
Location: Goshen County, Wyoming; 370 feet south and 45 feet west of northeast corner of Section 8, T28N, R61W.
Vegetation: Cultivated; wheat stubble.
Slope: 3 percent colluvial slope; slightly convex, faces south; well drained.
Parent material: Weathered Brule siltstone plus some loess and colluvium.
Described by: C. J. Fox, September 24, 1953.

Horizon and Mandan Lab. Number	
Ap 1884	0 to 2½ inches. Light brownish gray (10YR 6/2 dry) to dark grayish brown (10YR 4/2 moist) moderately calcareous loam; single grain and weak fine granular structure; hard when dry, friable when moist; many fine roots; abrupt smooth boundary.
AC 1885	2½ to 5½ inches. Grayish brown (10YR 5/2 dry) to dark grayish brown (10YR 4/2 moist) moderately calcareous friable loam; medium weak angular blocky structural units crush to single grains and very fine weak granules; many fine roots; clear smooth boundary.
C1 1886	5½ to 11 inches. Pale brown (10YR 6/3 dry) to dark grayish brown (10YR 4/2 moist) strongly calcareous, coarse weak prismatic silt loam that crushes to single grains and very fine weak granules; hard when dry, friable when moist; many fine roots; numerous tiny Brule fragments; clear wavy boundary.
C2 1887	11 to 17 inches. Grayish brown (10YR 5/2.5 dry) or dark grayish brown (10YR 4/2 moist) very fine granular friable silt loam; strongly calcareous; some roots; clear wavy boundary.
C3 1888	17 to 22 inches. Pale brown (10YR 6/3 dry) to brown (10YR 4/3 moist) very friable weak fine granular and single grained silt loam; strongly calcareous; occasional roots; gradual wavy boundary.
C4 1889	22 to 32 inches. Pale brown (10YR 6/3 dry) or brown (10YR 5/3 moist) very strongly calcareous massive friable silt loam; few roots; abrupt irregular boundary.
R	32 inches plus. (Not sampled.) Calcareous fragmental Brule bedrock.

Note: Small (1/8- to 1/4-inch) calcareous Brule fragments and small quartz pebbles in profile and on surface.

SOIL SURVEY LABORATORY Mandan, N. Dak.

SOIL TYPE Keota loam **LOCATION** Goshen County, Wyoming

SOIL NOS. S53Wyo-8-2 **LAB. NOS.** 1890-1894

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2	TEXTURAL CLASS
0-4½	Ap	1.6	2.0	1.3	7.2	35.9	39.4	12.6	64.5	16.2	-	1
4½-9	C1	0.8	1.7	1.2	7.0	34.4	40.5	14.4	63.0	17.1	-	1
9-15	C2	0.8	1.9	1.2	4.7	31.9	44.5	15.0	60.2	19.7	-	1
15-23	C3	1.6	2.1	0.9	4.4	31.1	44.9	15.0	58.9	20.5	-	1
23-32	C4	1.8	2.5	1.1	4.9	27.5	49.4	12.8	57.1	23.4	-	1

DEPTH INCHES	pH 8C1b SATURATED PASTE	8C1a 1:5	8C1a 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	NITROGEN %	C/N	8A2 EST% SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC×10³ MILLIMHOS PER CM 8A1a	6F1a $CaCO_3$ equivalent %	6F1a GYPSUM me./100g. SOIL	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
0-4½	7.8	8.3	8.5	1.12			<0.20	0.7	6				11.1
4½-9	7.7	8.2	8.5	0.90			<0.20	0.6	7				11.7
9-15	7.8	8.1	8.4	0.69			<0.20	0.6	10	-			13.1
15-23	7.8	8.1	8.5	0.66			<0.20	0.6	10	-			10.1
23-32	7.8	8.2	8.5	0.60			<0.20	0.7	11	-			13.0

Soil type: Keota loam
Soil No.: S53Wyo-8-2
Location: Goshen County, Wyoming; northeast corner of northwest quarter of northeast quarter of Section 20, T24N, R62W; 70 feet south of road; photo 9-50.
Vegetation: Cultivated; wheat stubble.
Slope: 3 percent colluvial slope; plane, faces southwest; well drained.
Parent material: Weathered Brule siltstone plus some loess and probably a little colluvium.
Described by: C. J. Fox, September 24, 1953.

Horizon and Mandan Lab. Number	
Ap 1890	0 to 4½ inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) moderately calcareous very fine weak granular and single grained loam; friable when moist, slightly hard when dry; many roots and some tiny Brule fragments; abrupt smooth boundary.
C1 1891	4½ to 9 inches. Pale brown (10YR 6/3 dry) to dark grayish brown (10YR 4/2 moist) moderately calcareous coarse weak prismatic loam; crushes to single grains and fine weak granules; friable when moist, slightly hard when dry; some fine roots and Brule fragments; gradual smooth boundary.
C2 1892	9 to 15 inches. Pale brown (10YR 6/3 dry) or dark grayish brown (4/2 moist) single grain and weak fine granular loam; strongly calcareous; friable when moist, slightly hard when dry; many fine root hairs and occasional tiny Brule chips; gradual smooth boundary.
C3 1893	15 to 23 inches. Pale brown (10YR 6/3 dry) to brown (10YR 4/3 moist) massive friable strongly calcareous loam; occasional fine roots and tiny Brule fragments; gradual smooth boundary.
C4 1894	23 to 32 inches. Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist) strongly calcareous massive friable loam that crushes to single grains; a few fine roots and Brule fragments; abrupt irregular boundary.
R	32 inches plus. (Not sampled.) Calcareous fragmental Brule siltstone; white spots and films of calcium carbonate in cracks.

SOIL SURVEY LABORATORY Mandan, N. Dak.

SOIL TYPE Kim clay loam, alkali phase **LOCATION** Goshen County, Wyoming

SOIL NOS. S50Wyo-8-5 **LAB. NOS.** 535-540

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2 (<19mm)	TEXTURAL CLASS
0-3	A1	4.1	3.4	2.6	5.8	11.7	37.6	34.8	30.8	22.3	Tr.	cl
3-8	AC	1.6	1.5	1.7	6.5	15.4	39.1	34.2	32.9	26.1	1	cl
8-14	C1ca	12.3	10.1	5.5	9.0	8.8	27.8	26.5	23.6	18.6	-	scl
14-20	C2ca	0.3	1.0	1.2	3.4	9.7	44.4	40.0	26.4	29.9	-	sicl/sic
20-60	C3ca	-	0.7	0.8	2.1	9.4	45.2	41.8	26.5	29.5	-	sic
a		0.3	3.0	4.1	8.8	14.6	32.2	37.0	33.1	19.1	-	cl

	pH		ORGANIC MATTER			8A2	8A1a ELECTRICAL CONDUCTIVITY EC×10³ MILLIMHOS PER CM	6E1a	6F1a	MOISTURE TENSIONS		
8C1b SATURATED PASTE	8C1a 1:5	8C1a 1:10	6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	EST% SALT (BUREAU CUP)		$CaCO_3$ equivalent %	GYPSUM me./100g. SOIL	1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
7.8	9.0	9.1	0.57	.066	8.6	-	0.6	10	-			17.9
7.9	8.3	9.5	0.29	.032	9.1	-	0.8	11	-			19.5
8.2	9.7	9.8	0.13	.018		-	0.9	13	-			16.7
8.2	9.6	9.8	0.21	.029		-	1.0	10	-			25.6
7.9	9.3	9.5	0.28	.037	7.6	0.3	3.0	8	-			24.9
7.6	8.4	8.6	1.48	.140	10.6	-	1.0	8	-			19.8

5A1a CATION EXCHANGE CAPACITY NH_4OAc	EXCHANGEABLE CATIONS 5B1b Ca	Mg	H	6P2a Na	6Q2a K	5D2 EXCH. Na %	8A1 SATURATION EXTRACT SOLUBLE 6P1a Na	6Q1a K	6J1a HCO_3	6K1a Cl	6L1a SO_4	8A MOISTURE AT SATURATION %
←	millieq. per 100g. soil →						← millieq. per liter →					
34.7				2.3	2.2	6	4.2	2.7				52.3
35.6				5.0	1.7	14	7.4	2.5				59.8
28.4				7.7	1.6	27	8.3	1.2				47.9
39.0				12.5	2.6	32	10.1	-				70.5
40.9				11.8	2.9	29	32.7	-	2.3	3.8	3.8	71.3
33.8				0.8	3.6	2	1.9	1.4				61.8

a. Composite irrigated surface sample from SW1/4 SW1/4 SW1/4 Section 34, T24N, R62W.

Soil type: Kim clay loam, alkali phase
Soil No.: S50Wyo-8-5
Location: Northwest quarter of northeast quarter of Section 4, T23N, R62W, Goshen County, Wyoming.
Vegetation: Sparse cover of western wheatgrass, herbs and weeds; virgin pasture.
Slope: North-facing colluvial slope of 2 percent gradient.
Described by: W. M. Johnson.

Horizon and
Mandan
Lab. Number

A1
535 — 0 to 3 inches. Light brownish gray (10YR 6/2.5 dry) to grayish brown (10YR 5/2.5 moist) with numerous tiny specks of very pale brown, hard, friable, plastic clay loam; weak subangular blocks crush to weak granules; strongly calcareous; moderate number of grass roots; indistinct boundary.

AC — 3 to 8 inches. Light brownish gray (10YR 6/2.5 dry) to grayish brown (10YR 5/2.5 moist) hard, friable, roots.

C1ca
537 — 8 to 14 inches. Light brownish gray (10YR 6.5/2 dry, 6/2.5 moist) with numerous specks and spots of white, hard, friable silty clay loam containing many medium and coarse sand-sized particles of Brule siltstone; very weak coarse prisms break to weak irregular blocks; strongly calcareous; few roots.

C2ca
538 — 14 to 20 inches. Light gray (10YR 7/2.5 dry) to brown (10YR 5.5/3 moist) with a few very pale brown specks, very hard, friable, plastic light silty clay; very weak irregular prisms break to very weak irregular coarse blocks; strongly calcareous; few roots.

C3ca
539 — 20 to 60 inches. Light gray (10YR 7/2 dry) to brown (10YR 5/3 moist) with a few white spots; massive; hard, friable, plastic light silty clay; strongly calcareous; very few roots.

SOIL SURVEY LABORATORY Mandan, N. Dak.

SOIL TYPE Kim sandy clay loam, alkali phase **LOCATION** Goshen County, Wyoming

SOIL NOS. S52Wyo-8-3 **LAB. NOS.** 1248-1254

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2	TEXTURAL CLASS
0-3	A1p	0.4	4.0	6.4	16.3	25.3	22.8	24.8	49.3	9.1	-	scl
3-11½	A12	0.5	3.8	6.4	17.4	26.4	21.5	24.0	50.4	8.3	-	scl
11½-15½	B2	0.5	4.5	7.3	18.4	25.6	21.4	22.3	49.7	8.6	Tr.	scl
15½-22	B3	0.1	1.6	3.6	11.4	19.3	33.4	30.6	38.8	21.3	-	cl
22-28	Bca	0.2	0.9	1.4	4.3	8.2	41.7	43.3	19.5	33.2	-	sic
28-45	Cu-ca	-	0.2	0.7	3.1	19.3	57.8	18.9	50.3	29.1	-	sil
45-60+	Cu	-	0.8	2.7	9.2	23.9	46.3	17.1	54.6	21.7	-	l

8C1b SATURATED PASTE	pH 8C1a 1:5	8C1a 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	NITROGEN %	C/N	8A2 EST% SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC×10³ MILLIMHOS PER CM 8A1a.	6E1a $CaCO_3$ equivalent %	6F1a GYPSUM me./100g. SOIL	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
8.0	9.1	9.4	0.96			-	3.4	2	-			13.7
7.9	9.1	9.4	0.81			-	3.5	2	-			13.3
8.0	9.4	9.5	0.40			0.23	4.4	1	-			13.4
8.4	9.7	9.8	0.36			0.22	4.0	13	-			21.1
8.8	9.8	10.0	0.35			0.36	4.4	24	-			27.9
8.6	9.7	9.8	0.14			0.42	8.7	13	-			16.9
8.6	9.6	9.8	0.09			0.34	6.0	8	-			13.5

5A1a CATION	EXCHANGEABLE CATIONS 5B1b			6P2a	6Q2a	5D2	8A1 SATURATION EXTRACT SOLUBLE 6P1a	6Q1a				8A MOISTURE

Soil type: Kim sandy clay loam, alkali phase
Soil No.: 852Wyo-8-3
Location: Goshen County, Wyoming; northwest quarter of southwest quarter of Section 36, T23N, R62W; 40 rods east of highway and about 100 feet south of railroad; photo 11-66.
Vegetation: Irrigated sugar beets.
Slope: Nearly level loess-filled valley.
Described by: C. J. Fox, October 1952.

Horizon and Mandan Lab. Number	
Alp 1248	0 to 3 inches. Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist) fine granular friable sandy clay loam; moderately calcareous; a moderate accumulation of salt efflorescence on surface; clear boundary.
A12 1249	3 to 11½ inches. Pale brown (10YR 6/3 dry) to dark brown (10YR 4/3 moist) friable clay loam with medium moderately developed prismatic blocky structure; crushes to medium moderately developed granules; moderately calcareous; gradual boundary.
B2 1250	11½ to 15½ inches. Pale brown (10YR 6/3 dry) to dark brown (10YR 4/3 moist) clay loam with coarse weakly prismatic blocky structure; blocky units crush to weak medium granules; moderately calcareous; friable; clear boundary.
B3 1251	15½ to 22 inches. Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist) heavy silty clay loam with coarse weak prismatic blocky structure which crushes to weak medium granules; hard, friable; strongly calcareous; some fine roots; clear boundary.
Bca 1252	22 to 28 inches. Very pale brown (10YR 7/3 dry) to pale brown (10YR 6/3 moist) friable silty clay loam with coarse indistinct prismatic structure which crushes to fine weakly developed granules; strongly calcareous; clear boundary.
Cu-ca 1253	28 to 45 inches. Very pale brown (10YR 7/4 dry) to brown (10YR 5/3 moist) massive friable silt loam; moderately calcareous; gradual boundary.
Cu 1254	45 to 60 inches plus. Very pale brown (10YR 7/4 dry) to brown (10YR 5/3 moist) massive friable silt loam which is saturated with water; moderately calcareous.

OIL SURVEY LABORATORY Lincoln, Nebr. August 1959

SOIL TYPE Larimer fine sandy loam (20 to 30 inches over gravel) **LOCATION** Platte County, Wyoming

SOIL NOS. S58Wyo-16-4 **LAB. NOS.** 9269-9273

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1									2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 (<19mm)	
0-6	Ap	3.6	7.5	9.3	20.5	24.8	15.9	18.4	48.2	6.1	11	fsl

Soil type: Larimer fine sandy loam, 20 to 30 inches over gravel
Soil No.: S58Wyo-16-4
Location: Platte County, Wyoming; southwest quarter of northeast quarter of northwest quarter of Section 5, T24N, R68W; beginning at northwest corner (center of road junction) then east 1862 feet and south 681 feet.
Physiographic position: High terrace.
Topography: Nearly level; 1/2 percent slope, north aspect.
Drainage: Well drained.
Vegetation: Cultivated.
Use: Irrigated cropland; 1958 dry beans.
Collected by: James Allen, Keith Young, A. J. Cline, and R. C. Kronenberger, October 7, 1958.
Described by: A. J. Cline and Fraser Stephens.

Horizon and Lincoln Lab. Number	
Ap 9269	0 to 6 inches. Grayish brown (10YR 5/2 dry) to dark grayish brown (10YR 4/2 moist) fine sandy loam; very hard when dry, friable when moist; very weak medium subangular blocky structure breaking to weak very fine granules; noncalcareous; horizon temperature 17 degrees centigrade; lower boundary abrupt and smooth.
B2t 9270	6 to 10 inches. Light brownish gray (10YR 6/2 dry) to dark grayish brown or grayish brown (10YR 4.5/2 moist) very fine sandy clay loam; hard when dry, friable when moist; weak medium prismatic structure breaking to moderate medium subangular blocks; noncalcareous; there are thin nearly continuous clay skins on the surfaces of the soil aggregates; horizon temperature 15.5 degrees centigrade; lower boundary clear and wavy.
B3ca 9271	10 to 19 inches. Light yellowish brown or pale yellow (2.5Y 6.5/3 dry) to light olive brown (2.5Y 5/3 moist) very sandy clay loam; hard when dry, friable when moist; weak to moderate medium subangular blocky structure; violently calcareous; this is a moderate horizon of lime accumulation with visible lime occurring as concretions; there are thin patchy clay skins on both the horizontal and vertical faces of the soil aggregates; lower boundary clear and smooth; horizon temperature 15.5 degrees centigrade.
Cca 9272	19 to 30 inches. White (2.5Y 8/2 dry) to pale yellow (2.5Y 7/3 moist) gravelly sandy clay loam; slightly hard when dry, very friable when moist; massive; violently calcareous; this is a strong horizon of lime accumulation with visible lime occurring in divided forms; approximately 30 percent of this is gravel and cobble; horizon temperature 15.5 degrees centigrade; lower boundary gradual and wavy.
Dca 9273	30 to 38 inches plus. Light yellowish brown (2.5Y 6/3 dry) to light olive brown (2.5Y 5/3 moist) gravelly loamy coarse sand; loose when dry or moist; single grained; violently calcareous; approximately 25 percent of this horizon is gravel and cobble; there is lime coating the gravel and cobble fragments; horizon temperature 15.5 degrees centigrade.

Note: Air temperature at time of sampling 19 degrees centigrade.

SOIL SURVEY LABORATORY Lincoln, Nebr. August 1959

SOIL TYPE Larimer very fine sandy loam **LOCATION** Platte County, Wyoming

SOIL NOS. 858Wyo-16-8 **LAB. NOS.** 9296-9300

DEPTH	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1									2A2	TEXTURAL
	VERY				VERY						

Soil type: Larimer very fine sandy loam
Soil No.: S58Wyo-16-8
Location: Platte County, Wyoming; northeast quarter of southwest quarter of southwest quarter of Section 33, T24N, R68W; starting at southwest corner (center of crossroads), then east one quarter mile, north along fence line 1074 feet and then west 309 feet.
Physiographic position: High terrace.
Topography: Nearly level; 1 percent slope, northeast aspect.
Drainage: Well drained.
Vegetation: Buffalograss, blue grama, woolly plantain, green sagewort, yucca, and cacti.
Use: Pasture.
Collected by: James Allen, Keith Young, A. J. Cline, R. C. Kronenberger, and Fraser Stephens, October 8, 1958.
Described by: A. J. Cline, and Fraser Stephens.

Horizon and Lincoln Lab. Number	
A1 9296	0 to 4 inches. Grayish brown or light brownish gray (10YR 5.5/2 dry) to dark grayish brown (10YR 4/2 moist) very fine sandy loam; soft when dry, very friable when moist; moderate very fine granular structure; noncalcareous; horizon temperature 21 degrees centigrade; lower boundary clear and smooth.
AB 9297	4 to 6 inches. Grayish brown or brown (10YR 5/2.5 dry) to dark grayish brown or dark brown (10YR 4/2.5 moist) light clay loam; very hard when dry, friable when moist; weak coarse prismatic structure breaking to moderate medium subangular blocks; noncalcareous; there are thin patchy clay skins on both the horizontal and vertical faces of the soil aggregates; horizon temperature 20 degrees centigrade; lower boundary clear and smooth.
B21t 9298	6 to 10 inches. Brown (10YR 5/3 dry) to dark brown (10YR 4/3 moist) clay loam; very hard when dry, friable when moist; moderate medium prismatic structure breaking to moderate medium subangular blocks; noncalcareous; horizon temperature 19.5 degrees centigrade; there are thin nearly continuous clay skins on the surfaces of the soil aggregates; lower boundary clear and smooth.
B22t 9299	10 to 15 inches. Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist) clay loam; very hard when dry, friable when moist; weak to moderate medium prismatic structure breaking to moderate medium subangular blocks; noncalcareous; there are thin nearly continuous clay skins on the surfaces of the soil aggregates; this horizon has a few gravel fragments in the lower three inches; horizon temperature 19.5 degrees centigrade; lower boundary clear and wavy.
Cca 9300	15 to 24 inches. Pale yellow (2.5Y 8/3 dry) to light yellowish brown (2.5Y 6/3 moist) gravelly sandy clay loam; hard when dry, very friable when moist; massive; violently calcareous; this is a strong horizon of lime accumulation with visible lime occurring as concretions and in finely divided forms; approximately 20 percent of this horizon is gravel and cobble; lower boundary gradual and wavy; horizon temperature 19.5 degrees centigrade.
D	24 to 30 inches plus. (Not sampled.) Gravelly and cobbly sand; violently calcareous with moderate amounts of lime coating on the rocks particularly in the upper part of the horizon; approximately 40 to 60 percent of the horizon is coarse gravel and cobbles.

Note: Air temperature at the time of sampling 20.5 degrees centigrade.

SOIL SURVEY LABORATORY Lincoln, Nebr. August 1959

SOIL TYPE Larimer sandy loam **LOCATION** Platte County, Wyoming

SOIL NOS. S58Wyo-16-9 **LAB. NOS.** 9301-9305

PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1

DEPTH INCHES	HORIZON	1B1a VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2 <19mm	TEXTURAL CLASS
0-2	A1	7.0	11.9	12.5	20.4	21.4	15.0	11.8	44.7	4.6	13	sl
2-4	AB	3.8	10.9	13.8	24.2	18.9	11.9	16.5	41.8	4.2	8	fsl
4-11	B2t	1.1	8.6	13.0	21.9	15.3	14.6	25.5	37.9	5.2	7	scl
11-15	B3ca	5.6a	12.2a	12.2a	18.4a	10.7a	15.7	25.2	28.5	8.4	26	scl
15-25	Cca	14.4a	15.3a	10.2a	14.9a	11.1a	16.4	17.7	27.7	8.6	34	cosl

	pH 8C1a		ORGANIC MATTER 6A1a	6B1a		8A2	ELECTRICAL CONDUCTIVITY EC×10³ MILLIMHOS PER CM 8A1a	6E1a		MOISTURE TENSIONS		4B2
1:1	1:5	1:10	ORGANIC CARBON %	NITROGEN %	C/N	EST% SALT (BUREAU CUP)		$CaCO_3$ equivalent %	GYPSUM me./100g. SOIL	1/10 ATMOS. %	1/3 ATMOS. %	15 ATMOS. %
7.7	8.2	8.3	1.14	0.103	11.1	<0.20	0.6	1				4.9
7.9	8.2	8.3	1.02	0.104	9.8	<0.20	0.6	<1				6.3
7.8	8.2	8.5	0.90	0.091	10	<0.20	0.6	<1				9.6
7.9	8.3	8.6	1.49	0.161	9	<0.20	0.7	17				11.6
8.1	8.7	9.0	0.40	0.041	10	<0.20	0.5	30				7.7

5A1a	EXTRACTABLE CATIONS 5B1a					5D2	8A1 SATURATION EXTRACT SOL.				8A
CATION EXCHANGE CAPACITY NH_4Ac	6N2b Ca	6O2b Mg	6H1a H	6P2a Na	6Q2a K	EXCH. Na %	6P1a Na	6Q1a K			MOISTURE AT SATURATION %
← milliequivalents per 100g. soil →							← milliequivalents per liter →				
10.4		1.6	0.4	<0.1	0.8	<1	0.2	0.8			33.9
14.0		1.3	0.4	<0.1	0.4	<1	0.2	0.2			41.2
20.9		2.0	0.4	<0.1	0.4	<1	0.3	0.1			48.7
14.3		2.1	<0.1	<0.1	0.2	<1	0.4	0.1			51.2

Soil type: Larimer sandy loam
Soil No.: S58Wyo-16-9
Location: Platte County, Wyoming; southwest quarter of southeast quarter of northeast quarter of Section 28, T24N, R68W; starting at steel bolt on west end of concrete drop in Lateral No. 1 (approximately 730 feet west of east quarter corner of section), then west 127 feet and north 239 feet.
Physiographic position: High terrace.
Topography: Nearly level; 1 percent slope, northeast aspect.
Drainage: Well drained.
Vegetation: Buffalograss, blue grama, green sagewort, wild buckwheat, and yucca.
Use: Pasture.
Collected by: James Allen, Keith Young, A. J. Cline, R. C. Kronenberger, and Fraser Stephens, October 8, 1958.
Described by: A. J. Cline and Fraser Stephens.

Horizon and
Lincoln
Lab. Number

A1 0 to 2 inches. Gray or grayish brown (10YR 5/1.5 dry) to dark gray to dark grayish brown (10YR 4/1.5 [illegible]

noncalcareous; lower boundary clear and smooth.

AB
9302
2 to 4 inches. Grayish brown (10YR 5/2 dry) to dark grayish brown (10YR 4/2 moist) light sandy clay loam; hard when dry, very friable when moist; weak medium prismatic structure breaking to moderate medium subangular blocks; noncalcareous; there are thin patchy clay skins on both the horizontal and vertical faces of the soil aggregates; there is some gravel in this horizon but less than 5 percent of the volume is gravel or cobble; lower boundary clear and smooth.

B2t
9303
4 to 11 inches. Brown (10YR 5/3 dry) to brown or dark brown (10YR 4/3 moist) sandy clay loam; hard when dry, very friable when moist; moderate medium prismatic structure breaking to moderate medium subangular blocks; noncalcareous; approximately 5 percent of this horizon is gravel; there are thin nearly continuous clay skins on the surfaces of the soil aggregates; lower boundary gradual and wavy.

SOIL SURVEY LABORATORY Mandan, N. Dak.

SOIL TYPE Mitchell loam **LOCATION** Goshen County, Wyoming

SOIL NOS. S50Wyo-8-4 **LAB. NOS.** 527-534

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY			2A2	TEXTURAL CLASS

Soil type: Mitchell loam
Soil No.: S50Wyo-8-4
Location: Southeast quarter of southwest quarter of southwest quarter of Section 17, T25N, R63W, Goshen County, Wyo.
Vegetation: Good cover of blue grama, threadleaf sedge and needlegrass; virgin pasture.
Slope: Colluvial slope of 2 percent gradient.
Described by: W. M. Johnson.

Horizon and Mandan Lab. Number	
A1 527	0 to 2 inches. Light brownish gray (10YR 6/2 dry) to dark grayish brown (10YR 4/2 moist) soft friable weak coarse and medium granular coarse loam; mildly calcareous; grass roots very numerous; clear boundary.
C1 528	2 to 6 inches. Very pale brown (10YR 7/3 dry) to brown (10YR 5/3 moist) soft friable coarse silt loam; weak subangular blocks crush to weak coarse and medium granules; strongly calcareous; roots numerous; clear boundary.
C2 529	6 to 9 inches. Mixed very pale brown and light brownish gray (10YR 7/2.5 and 6/2 dry) to brown and dark grayish brown (10YR 5/2.5 and 4/2 moist) soft friable coarse silt loam containing a few 1/4- to 1/2-inch pebbles; weak prisms break to weak irregular blocks that in turn crush to weak coarse granules; strongly calcareous; roots numerous; clear boundary.
C3 530	9 to 28 inches. Very pale brown (10YR 7/3 dry) to brown (10YR 5/3.5 moist) weak prismatic soft friable coarse silt loam that breaks to weak irregular blocks; very strongly calcareous; moderate number of roots; clear boundary.
C4 531	28 to 33 inches. Mixed light brownish gray and grayish brown (10YR 6.5/2 and 5/2 dry) to dark grayish brown (10YR 4/2 moist) weak fine subangular blocky, slightly hard, friable silt loam that crushes to weak coarse granules; mildly calcareous; moderate number of roots; gradual boundary.
C5 532	33 to 46 inches. Very pale brown (10YR 7/2.5 dry) to brown (10YR 5/3.5 moist) hard friable weak irregular blocky heavy silt loam; very strongly calcareous; few roots; diffuse boundary.
C6 533	46 to 62 inches. Very pale brown (10YR 7.5/3 dry) to light yellowish brown (10YR 6/4 moist) hard friable massive heavy silt loam; very strongly calcareous; very few roots.

SOIL SURVEY LABORATORY Mandan, N. Dak.

SOIL TYPE Mitchell loam **LOCATION** Goshen County, Wyoming

SOIL NOS. S52Wyo-8-1 **LAB. NOS.** 1231-1237

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2	TEXTURAL CLASS
0-3½	A1p	0.2	0.6	1.3	9.4	39.6	35.2	13.7	69.5	11.7	-	1
3½-8½	A12	0.1	0.4	1.5	8.7	39.5	35.6	14.2	69.3	12.0	-	1
8½-15	AC	0.1	0.2	0.8	6.4	42.0	37.9	12.6	71.4	13.4	-	1
15-28	C11	0.2	0.7	1.7	9.0	38.0	36.5	13.9	68.3	12.6	-	1
28-41	C12	0.1	0.5	1.6	8.7	38.8	36.4	13.9	69.6	11.9	-	1
41-54	C13	0.1	0.3	1.0	17.4	31.4	37.6	12.2	71.5	13.2	-	1
50-60+	C14	-	0.4	0.9	6.8	48.8	33.9	9.2	77.3	10.7	-	vfsl

8C1b pH SATURATED PASTE	8C1a pH 1:5	8C1a pH 1:10	6A1a ORGANIC MATTER ORGANIC CARBON %	NITROGEN %	C/N	8A2 EST% SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC×10³ MILLIMHOS PER CM 8A1a	6E1a $CaCO_3$ equivalent %	6F1a GYPSUM me./100g. SOIL	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
7.9	8.7	8.9	1.03			-	0.8	1	-			9.9
7.8	8.7	8.9	0.95			-	0.8	1	-			9.5
7.8	8.8	8.9	0.57			-	0.8	4	-			10.2
7.9	8.9	9.0	0.31			-	0.6	5	-			9.0
7.9	9.0	9.1	0.25			-	0.7	4	-			9.0
8.0	9.1	9.3	0.25			-	0.6	4	-			9.7
8.0	9.1	9.3	0.22			-	0.6	4	-			9.8

5A1a CATION EXCHANGE CAPACITY NH_4OAc	EXCHANGEABLE CATIONS 5B1b Ca	Mg	H	6P2a Na	6Q2a K	5D2a EXCH. Na %	8A1 SATURATION EXTRACT SOLUBLE 6P1a Na	6Q1a K	8A MOISTURE AT SATURATION %
	← milliequivalents per 100g. soil →						← milliequivalents per liter →		
23.8				0.4	2.0	2	2.2	0.8	42.4
20.2				0.4	1.5	2	2.2	0.5	43.7
19.0				0.4	1.1	2	1.7	0.2	41.7
16.6				0.4	0.8	2	1.5	-	40.1
17.6				0.4	1.3	2	1.7	0.2	37.4
18.2				0.5	1.8	3	1.7	0.5	37.1
18.9				0.2	1.9	1	1.3	0.8	39.5

Soil type: Mitchell loam
Soil No.: S52Wyo-8-1
Location: Goshen County, Wyoming; northeast corner of northwest quarter of southwest quarter of Section 13, T24N, R62W; 375 feet south and 175 feet east of intersection of field trail and head of drainage ditch.
Vegetation: Cultivated; irrigated alfalfa.
Slope: About 1 percent slope to the northeast.
Described by: C. J. Fox, October 1952.

Horizon and Mandan Lab. Number	
Alp 1231	0 to 3½ inches. Grayish brown (10YR 5/2 dry) to dark grayish brown (10YR 4/2 moist) friable, weak fine granular loam; moderately calcareous; clear boundary; 42 degrees F. at 2½ inches.
A12 1232	3½ to 8½ inches. Grayish brown (10YR 5/2 dry) to dark grayish brown (10YR 4/2 moist) friable, single grain and weak fine granular loam; firm when dry; strongly calcareous; clear boundary.
AC 1233	8½ to 15 inches. Pale brown (10YR 6/3 dry) to dark grayish brown (10YR 4/2 moist) weak coarse, prismatic silt loam; prisms break to weak coarse irregular blocks which crush to weak very fine granules; friable; strongly calcareous; clear boundary.
C11 1234	15 to 28 inches. Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist) friable weak irregular blocky silt loam which crushes to weak very fine granules; strongly calcareous; gradual boundary.
C12 1235	28 to 41 inches. Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist) friable weak fine granular silt loam; strongly calcareous; gradual boundary.
C13 1236	41 to 54 inches. Pale brown (10YR 6/3 dry) to yellowish brown (10YR 5/4 moist) friable weak fine granular and single grain silt loam; strongly calcareous; gradual boundary; 56 degrees F. at 52 inches.
C14 1237	54 to 60 inches plus. Pale brown (10YR 6/3 dry) to yellowish brown (10YR 5/4 moist) friable weak fine granular silt loam; strongly calcareous; alfalfa roots penetrate to almost 5 feet.

Note: Scattered small (1/8- to 1/2-inch) chips and fragments of Brule siltstone occur in all horizons.

SOIL SURVEY LABORATORY Mandan, N. Dak.

SOIL TYPE Mitchell loam **LOCATION** Goshen County, Wyoming

SOIL NOS. S52Wyo-8-4 **LAB. NOS.** 1255-1259

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2	TEXTURAL CLASS
0-6½	A1p	0.7	2.2	3.4	9.4	22.6	44.8	16.9	54.2	19.2	-	l
6½-22	AC	2.3	6.0	6.1	14.3	17.5	37.4	16.4	44.7	18.8	-	l
22-36	C11	3.3	7.6	6.7	15.6	17.7	38.0	11.1	46.8	18.4	-	l
36-50	C12	3.4	10.0	7.4	14.9	17.8	37.4	9.1	46.2	18.0	-	fsl
50-62	C13	5.1	9.0	6.9	14.5	19.3	38.3	6.9	49.1	17.4	-	fsl

DEPTH INCHES	HORIZON	pH 8C1b SATURATED PASTE	8C1a 1:5	8C1a 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	NITROGEN %	C/N	8A2 EST% SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC×10³ MILLIMHOS PER CM 8A1a	6E1a $CaCO_3$ equivalent %	6F1a GYPSUM me./100g. SOIL	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS.
0-6½	A1p	7.5	8.3	8.5	1.63			-	1.3	2	-			14.7
6½-22	AC	7.6	8.6	8.8	0.92			-	0.8	10	-			17.3
22-36	C11	7.8	8.9	9.1	0.34			-	0.8	9	-			16.2
36-50	C12	8.2	8.9	9.1	0.20			-	1.1	10	-			16.2
50-62	C13	8.2	9.4	9.6	0.06			-	1.2	8	-			16.0

DEPTH INCHES	HORIZON	5A1a CATION EXCHANGE CAPACITY NH_4OAc	EXCHANGEABLE CATIONS Ca	Mg	H	6P2a Na	5B1b 6Q2a K	5D2 EXCH. Na %	8A1 SATURATION EXTRACT SOLUBLE 6P1a Na	6Q1a K	8A MOISTURE AT SATURATION %
		← milliequivalents per 100g. soil →							← milliequivalents per liter →		
0-6½	A1p	28.5				0.5	1.9	2	2.2	0.6	47.2
6½-22	AC	29.3				0.5	2.1	2	1.3	0.4	47.0
22-36	C11	29.1				1.7	2.6	6	5.0	0.4	43.1
36-50	C12	28.5				5.4	2.0	19	10.9	0.2	40.4
50-62	C13	29.0				6.5	1.7	22	11.7	0.2	42.3

Soil type: Mitchell loam
Soil No.: S52Wyo-8-4
Location: Goshen County, Wyoming; northwest quarter of northwest quarter of northwest quarter of Section 11, T23N, R61W; 30 rods south and about 20 rods east of road intersection at northwest corner of section; photo 14-36.
Vegetation: Cultivated; recently cultivated after removal of this year's crop.
Slope: Upland slope to north, 3 percent.
Described by: C. J. Fox, October 1952.

Horizon and Mandan Lab. Number	
Alp 1255	0 to 6½ inches. Light brownish gray (10YR 6/2 dry) to dark grayish brown (10YR 4/2 moist) weak fine granular loam; moderately calcareous; soft, very friable; clear boundary; 40 degrees F. at 2 inches; air temperature 44 degrees F. at 9:30 A.M.
AC 1256	6½ to 22 inches. Pale brown (10YR 6/3 dry) to dark brown (10YR 4/3 moist) friable weak fine granular silt loam containing occasional tiny Brule fragments; strongly to very strongly calcareous; clear boundary; 54 degrees F. at depth of 12 inches.
C11 1257	22 to 36 inches. Very pale brown (10YR 7/3 dry) to brown (10YR 5/3 moist) friable weak fine granular silt loam; very strongly calcareous; 58 degrees F. at depth of 24 inches; 60 degrees at 36 inches.
C12 1258	36 to 50 inches. Very pale brown (10YR 7/3 dry) to brown (10YR 5/3 moist) friable weak fine granular silt loam; strongly calcareous; 60 degrees F. at depth of 48 inches.
C13 1259	50 to 62 inches. Very pale brown (10YR 7/3 dry) to brown (10YR 5/3 dry) friable weak fine granular silt loam containing occasional tiny Brule fragments; strongly calcareous; 60 degrees F. at 60 inches.

Note: Occasional nests of gypsum crystals occur in the profile below 24 inches.

SOIL SURVEY LABORATORY Mandan, N. Dak.

SOIL TYPE Mitchell loam **LOCATION** Goshen County, Wyoming

SOIL NOS. S52Wyo-8-6 **LAB. NOS.** 1267-1272

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)								3A1	2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2	
0-3½	A1p	1.6	4.0	5.0	11.7	24.1	39.6	14.0	52.6	18.3	-	l
3½-8	A12	0.9	4.4	5.3	12.2	24.2	38.9	14.1	52.7	17.8	-	l
8-16	AC	1.3	4.4	5.0	11.9	23.9	41.1	12.4	53.1	19.4	-	l
16-28	C11	2.6	5.3	4.4	10.2	21.6	46.4	9.5	51.0	23.6	-	l
28-42	C12	0.5	2.3	3.4	11.6	13.7	57.7	10.8	55.2	24.1	-	sil
42-60	C13	0.2	1.0	1.7	7.9	35.7	43.9	9.6	57.9	27.4	-	l

Soil type: Mitchell loam
Soil No.: S52Wyo-8-6
Location: Goshen County, Wyoming; southwest corner of northeast quarter of southeast quarter of Section 5, T24N, R62W; 150 feet north of small lateral and about 600 feet southeast of row of trees.
Vegetation: Cultivated; recently in irrigated beans.
Slope: 2 percent slope to north.
Described by: C. J. Fox, October 1952.

Horizon and Mandan Lab. Number	
Alp 1267	0 to 3½ inches. Pale brown (10YR 6/3 dry) to dark brown (10YR 4/3 moist) weak fine granular loam containing occasional tiny Brule fragments; very friable when moist, hard when dry; strongly calcareous; clear boundary.
Al2 1268	3½ to 8 inches. Pale brown (10YR 6/3 dry) to dark grayish brown (10YR 4/2 moist) very weak fine granular silt loam containing occasional tiny Brule fragments; friable when moist, hard when dry; strongly calcareous; clear boundary.
AC 1269	8 to 16 inches. Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist) very friable weak fine granular silt loam with many tiny Brule fragments; occasional worm casts containing worm excrement; strongly calcareous; gradual boundary.
C11 1270	16 to 28 inches. Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist) massive silt loam containing occasional tiny Brule fragments; some fine roots; soil is very wet; strongly calcareous; gradual boundary.
C12 1271	28 to 42 inches. Very pale brown (10YR 7/3 dry) to yellowish brown (10YR 5/4 moist) massive silt loam with occasional tiny Brule fragments; soil is water saturated; strongly calcareous; gradual boundary.
C13 1272	42 to 60 inches. Very pale brown (10YR 7/3 dry) to yellowish brown (10YR 5/4 moist) massive waterlogged silt loam containing small Brule fragments; some fine roots at 5 feet; strongly calcareous.

SOIL SURVEY LABORATORY Mandan, N. Dak.

SOIL TYPE Mitchell **LOCATION** Goshen County, Wyoming

SOIL NOS. S52Wyo-8-7 **LAB. NOS.** 1273-1278

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2	TEXTURAL CLASS
0-8	A1p	0.1	0.3	1.2	5.4	41.9	32.1	19.0	69.0	9.1	-	1
8-16	AC	-	0.2	0.7	3.2	31.9	42.2	21.8	61.3	15.3	-	1
16-27	C11	-	-	0.1	0.9	19.4	59.3	20.3	53.6	25.8	-	sil
27-35	C12	-	-	0.1	0.9	23.2	60.4	15.4	61.2	23.2	-	sil
35-54	C13	-	-	0.2	1.7	31.9	51.5	14.7	67.7	17.1	-	sil
54-62	C14	-	0.1	0.3	1.9	37.7	47.0	13.0	70.9	15.4	-	1

pH			ORGANIC MATTER		8A2	ELECTRICAL CONDUCTIVITY	6E1a	6F1a	MOISTURE TENSIONS		
8C1b SATURATED	8C1a	8C1a	6A1a ORGANIC	NITRO-	EST% SALT (BUREAU	EC x 10^3	$CaCO_3$ equiv.	GYPSUM me./100g.	1/10	1/3	4B2 15

Soil type: Mitchell loam
Soil No.: S52Wyo-8-7
Location: Goshen County, Wyoming; southwest corner of southwest quarter of Section 31, T23N, R60W; about 500 feet east and 200 feet north of curve in blacktop road; photo 15-64.
Vegetation: Cultivated; recently in irrigated beans.
Slope: About 2 percent gradient in ridge top.
Described by: C. J. Fox, October 1952.

Horizon and Mandan Lab. Number	
Alp 1273	0 to 8 inches. Grayish brown (10YR 5/2 dry) to dark grayish brown (10YR 4/2 moist) weak fine granular loam; friable when moist, hard when dry; moderately calcareous; clear boundary.
AC 1274	8 to 16 inches. Light yellowish brown (10YR 6/4 dry) to dark brown (10YR 4/3 moist) friable silt loam; weak medium prismatic-subangular blocky structure which crushes to very weak fine granules; some roots and organic staining; moderately calcareous; clear boundary.
C11 1275	16 to 27 inches. Very pale brown (10YR 7/3 dry) to pale brown (10YR 6/3 moist) friable weak fine granular silt loam; strongly calcareous; gradual boundary.
C12 1276	27 to 35 inches. Very pale brown (10YR 7/3 dry) to brown (10YR 5/3 moist) friable massive silt loam; strongly calcareous.
C13 1277	35 to 54 inches. Very pale brown (10YR 7/3 dry) to brown (10YR 5/3 moist) friable massive silt loam; strongly calcareous.
C14 1278	54 to 62 inches. Very pale brown (10YR 7/3 dry) to brown (10YR 5/3 moist) friable massive silt loam; strongly calcareous.

SOIL SURVEY LABORATORY Mandan, N. Dak.

SOIL TYPE Otero fine sandy loam **LOCATION** Goshen County, Wyoming

SOIL NOS. S53Wyo-8-5 **LAB. NOS.** 1907-1913

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2	TEXTURAL CLASS
0-5	A1p	1.7	9.5	13.7	24.0	23.4	12.9	14.8	44.5	4.9	Tr.	fsl
5-16	AC	0.5	12.0	17.6	26.2	17.7	9.7	16.3	36.2	4.6	-	sl
16-24	C1	-	9.8	18.7	26.5	19.4	10.8	14.8	38.7	4.7	-	fsl
24-33	C2	0.3	7.8	14.4	24.5	21.6	14.8	16.6	43.0	6.3	-	fsl
33-38	C3	-	12.5	18.8	28.4	17.8	9.2	13.3	37.3	4.1	-	sl
38-46	C4	0.5	14.6	19.8	28.0	17.2	7.8	12.1	36.1	3.2	-	sl
46-60	IIC5	-	1.7	4.3	17.3	39.7	21.1	15.9	64.1	8.2	-	vfsl

8C1b SATURATED PASTE	pH 8C1a 1:5	8C1a 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	NITROGEN %	C/N	8A2 EST% SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC×10³ MILLIMHOS PER CM 8A1a	6E1a $CaCO_3$ equivalent %	6F1a GYPSUM me./100g. SOIL	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
7.6	8.2	8.4	0.59			<0.20	1.3	2				7.3
7.6	8.4	8.5	0.34			<0.20	0.6	7				7.7
7.7	8.5	8.6	0.21			<0.20	0.6	6	-			7.0
7.6	8.4	8.8	0.19			<0.20	0.6	6	-			7.6
7.7	8.8	8.9	0.13			<0.20	0.6	5	-			5.8
7.7	8.8	9.0	0.07			<0.20	0.6	5	-			6.3
7.8	8.8	9.1	0.12			<0.20	0.7	5	-			8.0

5A1a CATION EXCHANGE CAPACITY NH_4OAc	5B1a CATIONS EXTRACTABLE Ca	6O2b Mg	H	5B1b EXCHANGEABLE 6P2a Na	6Q2a K	5D2 EXCH. Na %	8A1 SATURATION EXTRACT SOLUBLE 6P1a Na	6Q1a K	8A MOISTURE AT SATURATION %
←	milliequivalents per 100g. soil →						← milliequivalents per liter →		
14.8		1.8		0.1	1.1	1	0.6	1.0	30.1
11.8		1.8		0.2	0.6	2	0.6	0.4	31.0
11.6		2.4		0.2	0.8	2	0.6	0.4	29.1
12.6		3.2		0.4	1.3	3	0.9	0.8	30.0
9.6		2.7		0.4	1.1	4	0.9	0.8	24.8
9.6		3.0		0.4	1.2	4	1.7	0.8	23.6
15.9		4.3		0.9	2.4	6	3.8	0.8	30.1

Soil type: Otero fine sandy loam
Soil No.: S53Wyo-8-5
Location: Goshen County, Wyoming; northeast corner of northeast quarter of Section 5, T22N, R62W; 50 feet south of road; photo 9-62.
Vegetation: Cultivated; fallow strip.
Slope: 5 percent upland; plane, faces southwest; well drained.
Parent material: Eolian sand, silt and clay, derived mainly from Brule and Chadron beds (Oligocene).
Described by: C. J. Fox, September 24, 1953.

Horizon and
Mandan
Lab. Number

[redacted]

1907 calcareous weak fine granular fine sandy loam; slightly hard when dry; many roots; abrupt smooth boundary.

AC
1908 5 to 16 inches. Brown (10YR 5/3 dry) or dark brown (10YR 4/3 moist) moderately calcareous friable weak coarse prismatic angular blocky heavy sandy clay loam; structural units coated slightly darker and crush to single grains and weak fine granules; soil slightly hard when dry; many roots; gradual smooth boundary.

C1
1909 16 to 24 inches. Light yellowish brown (10YR 6/4 dry) or yellowish brown (10YR 5/4 moist) strongly calcareous very coarse weak prismatic clay loam; units coated; crush to fine weak granules; friable when moist and slightly hard when dry; some fine roots; gradual smooth boundary.

[redacted]

1910 careous friable very coarse weak prismatic sandy clay loam; crushes to single grains and weak fine crumbs; gradual smooth boundary.

C3
1911 33 to 38 inches. Pale brown (10YR 6/3 dry) or brown (10YR 5/3 moist) strongly calcareous very friable sandy clay loam; gradual smooth boundary.

C4
1912 38 to 46 inches. Pale brown (10YR 6/3 dry) or brown (10YR 5/3 moist) strongly calcareous very friable sandy clay loam; few roots; gradual smooth boundary.

SOIL SURVEY LABORATORY Lincoln, Nebr. April 1963

SOIL TYPE Ptarmigan stony loam **LOCATION** Park County, Wyoming

SOIL NOS. S61Wyo-15-1 **LAB. NOS.** 15750-15758, 15794

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2 (<19mm)	TEXTURAL CLASS
2-0	O	a	a	a	a	a	a	a	a	a	20	
0-2	A11	22.1	9.7	4.1	8.6	6.2	37.6	11.7	30.9	17.7	34	l
2-9	A12	32.5	19.2	6.0	8.2b	4.3b	20.7	9.1	17.2	11.5	52	cosl
9-13	B21ir	19.6	18.9	9.1	15.5b	8.2b	23.6	5.1	26.9	12.7	42	cosl
13-25	B22ir	17.2	15.0	7.5	14.3b	9.9b	31.9	4.2	33.8	15.5	33	cosl
25-34	B23ir	19.1	15.5	7.2	12.9b	8.1b	33.0	4.2	29.9	17.8	34	cosl
34-45	B24ir	23.2	20.9	9.7	15.9b	8.0b	18.3	4.0	25.8	8.4	34	lcos
45-54	IIC1	27.2	24.8	11.6	17.5b	7.3b	9.7	1.9	21.7	3.6	51	lcos
54-76	IIIC2	23.4	19.0	9.2	14.5b	7.7b	22.4	3.8	27.8	9.3	28	lcos/cosl
54-76	c	2.9	3.6	2.6	8.6	13.5	61.6	7.2	53.1	27.4	2	sil

8C1a pH 1:1	6G1a Al KCl-Ext. me/100g	6C1a Ext. Iron as Fe %	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	Bulk Density Field Moist 4B4 % M.	4A1a g/cc	30 Cm. 4B3 % M.	4A1c g/cc	A.D. 4A1b g/cc	4A Db^{2}_{t} g/cc	4B2 15-Bar Water %
5.7d	-	0.8	13.4	1.13	14	40.7	0.78			0.92	0.6	37.5
5.2	0.1	1.0	9.81	0.568	17	32.4	0.90			0.97	0.7	19.7
5.0	1.1	0.9	2.51	0.305	8							7.6
4.7	3.0	0.8	1.42	0.172	8							5.4
4.7	4.2	1.1	1.02	0.094	11	13.0	1.40	19.1	1.38	1.39	0.7	4.1
4.5	3.9	1.0	0.67									3.7
4.8	2.3	1.0	0.25									3.1
4.9	0.5	0.7	0.11									2.0
5.2	0.3	1.0	0.13									2.4
5.0		1.4	0.28									

Soil type: Ptarmigan stony loam
Soil No.: S61Wyo-15-1
Location: Park County, Wyoming; Deep Lake Quadrangle USGS, 15 min. series, topographic; 200 feet east of benchmark, elevation 10,536 feet, Cooke City Highway; the benchmark is one-half mile north of Gardner Lake near Gardner Headwall on the highway; pit is across the highway (north), 250 feet off highway at east end of highway embankment and 500 feet southeast of small lake. The area is unsurveyed.
Exposure: 260 degree west-facing; slope 20 percent up east, 25 percent down west.
Physiography: Beartooth Plateau; stony hilly upland; lower three-fourths part of slope above a small lake.
Parent material: Schist with perhaps some diorite and quartzite.
Stoniness: Mainly sharp angular coarse fragments; 20 percent cobbles and stones; 30 percent gravels.
Vegetation: Surface has 75 percent turf, 20 percent rock, and 5 percent bare soil; dry avens and sedge.
Drainage: Medium to rapid. Climate: Cold, subhumid.
Temperature: 60 degrees F. on ground surface at 3:20 P.M.; 34.75 degrees F. at 90 inches depth at 5:00 P.M.
Collected by: R. C. McConnell, T. J. Nimlos, R. Taber, and C. A. Mogen, August 23, 1961.

Horizon and Lincoln Lab.No.

0 15750 — 2 to 0 inches. Very dark grayish brown (10YR 3/2) gravelly silt loam, 10YR 2/2 moist; moderate fine crumb; soft, very friable; abundant roots; estimated 20 percent by volume occupied by fine hair roots; 50 percent humus and plant remains, and 30 percent mineral matter; estimated 65 percent pore space; clear smooth boundary.

A11 15751 — 0 to 2 inches. Very dark grayish brown (10YR 3/2) gravelly silt loam, 10YR 2/2 moist; 25 percent subangular gravels; weak very fine granular; soft, very friable, slightly sticky and slightly plastic; abundant roots; very porous; estimated 40 percent pore space but without distinct pores; gradual lower boundary; abundant clear uncoated fine sand grains of mica and quartz.

A12 15752 — 2 to 9 inches. Very dark grayish brown (10YR 3/2) very gravelly loam, 10YR 2/2 moist; 50 percent coarse fragments of which 10 percent are cobbles, 10 percent coarse gravels, and 30 percent gravel less than 3/4-inch diameter; weak very fine granules; soft, very friable, slightly sticky and nonplastic; common clear uncoated fine sand grains of mica and quartz; abundant roots; very porous (est. 50 percent pore space) without distinct pores; gravel and cobble stained on underside, 7.5YR 2/4, generally concentrated around the outside edge with diffused inner boundary staining to 2.5YR 4/4; roots matted around gravel and cobbles; a few rocks on end, the remainder parallel with land surface; clear wavy boundary.

B21ir 15753 — 9 to 13 inches. Brown (7.5YR 4/4) very gravelly loam, 5YR 3/4 moist; 60 percent subangular coarse fragments including 20 percent fine gravel, 15 percent coarse gravel, 25 percent cobbles, and a few stones; weak very fine granular; soft, very friable, slightly sticky and nonplastic; abundant roots matting around gravel and [redacted]

[redacted]

outer edges of underside of cobbles and large gravels; few fine iron concretions that crush black and red; few elongated cobbles are on end, the rest lay parallel with land surface; clear irregular boundary.

B22ir 15754 — 13 to 25 inches. Yellowish brown (10YR 5/4) very gravelly loam, 7.5YR 4/4 moist; 50 percent subangular coarse fragments including about 15 percent cobble and stone; moderate fine platy; soft, friable, slightly sticky and nonplastic; plentiful roots, well distributed; many very fine pores, 30 percent pore space; gravel and cobbles stained 2.5YR 2/2 concentrated on outer edge of undersides of large gravel and cobbles and coating smaller gravel; few rocks on end, but most of the elongated fragments lay mainly parallel with land surface; diffuse lower boundary.

B23ir 15755 — 25 to 34 inches. Yellowish brown (10YR 5/4) cobbly gravelly loam, 7.5YR 4/4 moist; 60 percent coarse fragments including 25 percent cobbles and stones; moderate fine platy; soft, friable, slightly sticky and nonplastic; plentiful roots, well distributed, not matted; many very fine pores, 30 percent pore space; gravel and cobbles stained on underside and generally concentrated on outer edge of larger gravel and cobbles; few rocks on end, but most elongated or flattish fragments lay parallel with land surface; 1/8-inch thick accu-

SOIL SURVEY LABORATORY Lincoln, Nebr. April 1963

SOIL TYPE Ptarmigan stony loam **LOCATION** Park County, Wyoming

SOIL NOS. S61Wyo-15-2 **LAB. NOS.** 15759-15765

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2 (<2mm)	TEXTURAL CLASS
0-1½	A11	18.6	8.7	4.2	9.3a	6.8a	37.0	15.4	27.7	21.1	38	l
1½-5	A12	17.0	10.8	5.0	10.3a	6.9a	35.1	14.9	28.6	18.9	39	l
5-10	A13	14.9	11.3	5.6	11.6a	8.4a	37.1	11.3	33.6	18.0	31	l/cosl
10-18	B21ir	11.4	11.3	6.5	13.8a	9.3a	38.1	9.6	35.3	19.3	24	cosl/l
18-26	B22ir	11.8	12.6	7.3	14.0a	9.2a	34.2	10.9	34.0	16.6	21	sl/cosl
26-42	B23t	6.3	10.8	7.6	15.7a	11.0a	36.4	12.2	37.6	17.8	17	l/fsl
42-70	IIC	14.6	26.7	10.9	19.6a	10.5a	13.2	4.5	28.1	5.7	20	lcos

8C1a pH 1:1	6G1a A1 KCL-Ext. me/100	6C1a Ext. Iron as Fe d	ORGANIC MATTER 6A1a ORGANIC CARBON % C	6B1a NITROGEN %	C/N	Bulk Density Field Moist 4B4 % M.	4A1a g/cc	30 Cm. 4B3 % M.	4A1c g/cc	A.D. 4A1b g/cc	4A Dh^2_t g/cc d	4B2 15-Bar Water %

Soil type: Ptarmigan stony loam
Soil No.: S61Wyo-15-2
Location: Park County, Wyoming; Deep Lake Quadrangle USGS, 15 min. series, topographic; 2,640 feet north of benchmark, elevation 10,536 feet, Cooke City Highway. The benchmark is one-half mile north of Gardner Lake near Gardner Headwall on the highway; pit is north-northwest of Gardner Headwall about 3/8-mile north of highway at lower loup incline up the north face of Gardner Headwall; 130 degree compass direction east-southeast about 3/4-mile to site of Profile S61Wyo-15-1, Ptarmigan series. The area is unsurveyed.
Exposure: 40 degrees compass northeast-facing.
Slope: 9 percent slightly convex up south, 20 percent convex down north.
Physiography: Beartooth Plateau, stony hilly upland near north end of stony ridge extending as an undulating rock terrace north from the Gardner Headwall to overlooking a U-shaped alpine marsh valley on the north and a rocky canyon on the west-southwest.
Parent material: Granite-schist and some high mica.
Stoniness: Estimated 10 percent stones and 20 percent fine gravel on surface at sample site; stoniness ranges up to 100 percent angular flags and stones in narrow bands, 1 to 2 feet across, of rock polygons occurring in the vicinity.
Vegetation: Avens and some hairgrass.
Drainage: Medium to rapid runoff; medium rate of internal drainage. Climate: Cold, subhumid.
Temperature at 5:00 P.M. on August 21, 1961: 54 degrees F. at surface, 53 at 1 inch, 50 at 6, 48½ at 12, 47½ at 28, 47 at 40, and 38 degrees F. at 68 inches.
Remarks: The south side of pit is in an old rock rubble strip (rock polygon rim) with 95 percent angular cobbles and stones below the surface 10 inches; cobbles and stones are mainly oriented vertically. John Retzer

[redacted]

inches is of common occurrence above the permanently frozen zone in alpine soils. Permanently frozen ground was not found at this site, examined to a depth of 86 inches.
Collected by: R. C. McConnell, T. J. Nimlos, R. Taber, and C. A. Mogen, August 23, 1961.

Horizon and Lincoln Lab.No.	
A11 15759	0 to 1½ inches. Dark gray (10YR 4/1) stony fine gravelly loam, 10YR 2/2 moist; moderate medium crumb structure; soft, very friable, slightly sticky and slightly plastic; abundant roots; 15 percent material volume occupied by fine hair roots; estimated 65 percent pore space without distinct pores; abundant light-colored clean sand grains; clear smooth boundary.
A12 15760	1½ to 5 inches. Dark grayish brown (10YR 4/2) stony fine gravelly loam, 10YR 2/2 moist; weak medium crumb structure; soft, very friable, slightly sticky and slightly plastic; abundant roots; very porous; estimated 50 percent pore space but without distinct pores; abundant clear fine and very fine sand grains; gravel has 7.5YR 2/2 coating on undersides in small concavities; gradual boundary.
A13	5 to 10 inches. Grayish brown (10YR 5/2) stony fine gravelly loam, 10YR 3/3 moist; 25 percent [redacted]

[redacted]

SOIL SURVEY LABORATORY Mandan, North Dakota 9/19/55

SOIL TYPE Renohill clay loam **LOCATION** Campbell County, Wyoming

SOIL NOS. S54Wyo-3-1 **LAB. NOS.** 2450-2456

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1									2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	.02-0.002	> 2 <19mm	

Soil type: Renohill clay loam
Soil No.: S54Wyo-3-1

SOIL SURVEY LABORATORY Mandan, North Dakota 9/19/55

SOIL TYPE Renohill clay loam LOCATION Campbell County, Wyoming

SOIL NOS. S54Wyo-3-2 LAB. NOS. 2457-2463

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2 (<19mm)	TEXTURAL CLASS
0-3	A1	1.4	1.1	1.1	8.4	16.4	34.6	37.0	38.2	19.0	2	cl
3-4½	B1	1.4	0.9	0.8	6.5	16.0	33.8	40.6	35.9	19.0	1	c
4½-10	B2t	0.7	0.6	0.6	5.2	15.0	34.1	43.8	30.8	22.3	Tr.	c
10-15	B3ca	0.8	0.5	0.4	4.7	14.5	36.7	42.4	30.3	21.7	-	c
15-20	C1ca	1.1	0.6	0.6	7.7	19.8	33.5	36.7	38.1	21.4	-	cl
20-34	C2ca	2.1	0.6	0.6	7.1	19.2	35.3	35.1	38.2	22.1	1	cl
34-43+	R	0.2	0.3	0.5	7.0	20.7	37.1	34.2	41.6	21.8	-	cl

pH			ORGANIC MATTER		8A2	ELECTRICAL	6E1a		MOISTURE TENSIONS
8C1b SATU	8C1a	8C1a	6A1a	6B1a	EST% SALT	CONDUC-	C-CO-	GYPSUM	4B2

Soil type: Renohill clay loam
Soil No.: S54Wyo-3-2
Location: Campbell County, Wyoming; southwest quarter of northeast quarter of Section 7, T49N, R72W.
Physiographic position: Upland.
Drainage: Moderately well drained.
Topography: Convex slope approximately 7 percent facing northeast.
Vegetation: Short grasses, chiefly blue grama and scattered sage.
Use: Pasture.
Collected by: L. T. Alexander, James Allen, Harold Bindschadler, and A. J. Cline, August 16, 1954.
Described by: A. J. Cline.

Horizon and Lincoln Lab. Number	
A1 2457	0 to 3 inches. Light brownish gray (10YR 6/2.5 dry) to dark grayish brown (10YR 4/2 moist) clay loam; loose, dry; very friable, moist; weak coarse platy breaking to moderate fine granular; noncalcareous; lower boundary clear and smooth.
B1 2458	3 to 4½ inches. Grayish brown (10YR 4.5/2 dry) to dark grayish brown (10YR 3.5/2 moist) light silty

SOIL SURVEY LABORATORY Mandan, N. Dak.

SOIL TYPE Rosebud **LOCATION** Goshen County, Wyoming

very fine sandy loam

SOIL NOS. S53Wyo-8-7 **LAB. NOS.** 1920-1925

Soil type: Rosebud very fine sandy loam
Soil No.: S53Wyo-8-7
Location: Goshen County, Wyoming; 900 feet south of northwest corner of the southeast quarter of Section 36, T21N, R64W; 200 feet east of road; photo 5-75.
Vegetation: Cultivated; wheat stubble.
Slope: 4 percent upland; slightly convex, faces south; well drained.
Parent material: Eolian sands over calcareous Miocene sandstone.
Described by: C. J. Fox, September 28, 1953.

Horizon and Mandan Lab. Number	
Ap1 1920	0 to 2 inches. Dark grayish brown (10YR 4/2.5 dry) or very dark grayish brown (10YR 3/2 moist) noncalcareous friable very fine sandy loam; weak fine granular and single grain structure; abrupt wavy boundary.
Ap2 1921	2 to 8 inches. Dark grayish brown (10YR 4/2 dry) noncalcareous friable loam; extremely hard when dry; roots plentiful; removes in hard angular fragments; abrupt smooth boundary.
B21t 1922	8 to 12 inches. Dark brown (10YR 4/3 dry) or very dark grayish brown (10YR 3/2 moist) noncalcareous fine and medium strongly developed prismatic angular blocky sandy clay loam that crushes to fine moderately developed granules; plastic when wet, extremely hard when dry; roots abundant; clear smooth boundary.
B22t 1923	12 to 19 inches. Yellowish brown (10YR 5.5/4 dry) or brown (10YR 4/3 moist) noncalcareous coarse and medium weakly prismatic heavy fine sandy loam; prisms are thinly coated a darker color and break to medium moderately developed blocks that crush to very fine weak granules and single grains; blocky units moderately porous; friable when moist, extremely hard when dry; many old root channels and some fine roots; gradual wavy boundary.
B3 1924	19 to 28 inches. Light yellowish brown (10YR 6/4 dry) or brown (10YR 4.5/3 moist) noncalcareous friable coarse weak prismatic angular blocky fine sandy loam that crushes to single grains and very fine weak granules; hard when dry; a few fine roots and old root channels filled with dark brown material; gradual wavy boundary.
C 1925	28 to 33 inches. Pale brown (10YR 6/3 dry) or dark brown (10YR 4/3 moist) noncalcareous friable light fine sandy loam that removes in angular pieces that crush to single grains; extremely hard when dry; abrupt irregular boundary.
Dr	33 to 45 inches plus. (Not sampled.) Sandstone of the Arikaree formation (Miocene).

SOIL SURVEY LABORATORY Mandan, North Dakota 9-8-55

SOIL TYPE Rosebud very fine sandy loam **LOCATION** Goshen County, Wyoming

SOIL NOS. S54Wyo-8-2 **LAB. NOS.** 2526-2531

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2 <19mm	TEXTURAL CLASS
0-2	A1	1.0a	5.1	5.6	23.9	40.4	12.3	11.7	66.0	5.4	—	vfsl
2-6	B1	0.7a	3.0	2.7	11.8	34.4	14.8	32.6	52.5	6.1	--	scl
6-11	B21t	0.3a	2.6	2.4	7.8	31.9	25.1	29.9	53.2	10.2	—	scl
11-16	B22t	0.2a	2.4	2.4	7.3	34.0	30.6	23.1	59.2	11.3	--	l
16-21	B3	0.1a	2.0	2.1	6.6	35.0	35.1	19.1	61.2	14.3	--	l
21-23	C1ca	0.5	4.4	4.3	9.3	33.9	31.0	16.6	58.4	13.4	--	vfsl

8C1b SATURATED PASTE	pH 8C1a 1:5	8C1a 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	8A2 EST% SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC x 10^3 MILLIMHOS PER CM	6E1a $CaCO_3$ equivalent %	GYPSUM ma./100g. SOIL	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
6.4	7.1	7.1	1.33	.104	12.8	—		--				5.4
6.8	7.7	7.6	1.16	.101	11.5	—		—				13.1
7.1	8.0	8.0	0.75	.072	10.4	—		--				13.0
7.2	8.3	8.2	0.55	.061	9.0	—		--				10.2
7.6	8.6	8.6	0.43	.054	8.0	--		--				9.0
8.0	9.0	9.2	0.37			--		--b				8.9

5A1a CATION EXCHANGE CAPACITY ← NH_4Ac	EXTRACTABLE CATIONS 6N2b Ca	6O2b Mg	H	6P2a Na	6Q2a K	BASE SAT. %	SATURATION EXTRACT SOLUBLE Na	K	MOISTURE AT SATURATION %
	← milliequivalents per 100g. soil →						← milliequivalents per liter →		
10.9	7.1	2.1		0.1	0.8				
24.7	17.5	5.2		0.1	1.8				
24.9	17.9	5.5		0.2	2.0				
21.8	15.5	5.2		0.2	1.7				
21.6	16.6	5.5		0.3	1.9				
18.0		5.5		0.2	1.9				

a. Organic matter in sand fractions.
b. Re-examination of site by Arvad Cline and extractable calcium datum both indicate carbonates present.

Soil type: Rosebud very fine sandy loam
Soil No.: 854Wyo-8-2
Location: Goshen County, Wyoming; approximately 85 feet north and 50 feet east of southwest corner of Section 31, T19N, R63W.
Physiographic position: Upland.
Topography: Gentle convex slope approximately 3 percent facing east.
Drainage: Well drained.
Use: Pasture.
Vegetation: Chiefly short grasses, blue grama, buffalograss with some western wheatgrass.
Collected by: James Allen, Charles Fox, E. F. Brunkow, and A. J. Cline, August 30, 1954.
Described by: A. J. Cline.

Horizon and Lincoln Lab. Number	
A1 2526	0 to 2 inches. Grayish brown (10YR 5/2 dry) to very dark grayish brown (10YR 3/2 moist) fine sandy loam; soft when dry, very friable when moist; very weak fine platy to weak fine crumb structure; platiness is not uniform and degree of its expression varies from place to place; noncalcareous; lower boundary clear and smooth.
B1 2527	2 to 6 inches. Brown (7.5YR 5/3 dry) to dark brown (7.5YR 4/2 moist) light clay loam; very hard when dry, firm when moist; moderate medium columnar breaking to moderate medium subangular blocky; the tops of the columns are slightly rounded and aggregate faces are flecked with 10YR 8/2 materials; noncalcareous; lower boundary clear and smooth.
B21t 2528	6 to 11 inches. Brown (10YR 5/3 dry) to dark brown (10YR 3/3 moist) heavy silty clay loam; very hard when dry and very firm when moist; strong medium prismatic breaking to strong medium angular blocky; moderately thick and relatively prominent clay skins; noncalcareous; lower boundary gradational and wavy.
B22t 2529	11 to 16 inches. Brown (10YR 5/3.5 dry) to 10YR 4/3.5 moist light clay loam; hard when dry and friable when moist; moderate coarse prismatic to moderate coarse subangular blocky; there are a few thin patchy clay skins; noncalcareous; lower boundary clear and smooth.
B3 2530	16 to 21 inches. Pale brown (10YR 6/3.5 dry) to brown (10YR 5/3.5 moist) light fine sandy clay loam; hard when dry, friable when moist; weak coarse subangular blocky structure; noncalcareous; lower boundary abrupt and smooth.
C1ca 2531	21 to 23 inches. Very pale brown (10YR 8/3 dry) to pale brown (10YR 6/3 moist) very fine sandy loam; hard when dry, friable when moist; massive; calcareous; horizon contains moderate amounts of accumulated lime chiefly as lime flour but with a few calcium carbonate concretions; the horizon rests abruptly on hard bedrock of the Arikaree formation.

SOIL SURVEY LABORATORY Mandan, North Dakota 9-8-55

SOIL TYPE Rosebud loamy very fine sand **LOCATION** Goshen County, Wyoming

SOIL NOS. S54Wyo-8-3 **LAB. NOS.** 2532-2538

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2 (<19mm)	TEXTURAL CLASS
0-3	A1	1.3 a	4.8	6.4	25.0	43.4	12.0	7.1	71.6	5.4	-	lfs
3-6½	B1	1.1 a	4.3	5.1	25.0	42.5	9.8	12.2	70.3	4.1	-	vfsl
6½-13	B21t	0.3 a	0.7	1.0	10.1	37.9	24.8	25.1	62.4	9.4	-	scl
13-17	B22t	0.2 a	0.5	0.6	8.9	41.7	29.0	19.1	67.8	11.2	-	l
17-21	B3ca	0.3	0.9	1.1	15.5	46.8	21.2	14.2	73.7	7.9	-	vfsl
21-30	C1ca	0.2	0.4	0.6	16.9	47.0	24.0	10.9	76.4	10.6	-	vfsl
30-41	C2ca	0.2	0.9	1.2	22.9	50.0	14.5	10.3	80.1	5.9	-	vfsl

8C1b SATURATED PASTE	pH 8C1a 1:5	8C1a 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	8A2 EST% SALT (BUREAU CUP)	ELECTRICAL CONDUCTIVITY EC×10³ MILLIMHOS PER CM @25°C.	6E1a $CaCO_3$ equivalent %	GYPSUM me./100g. SOIL	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
6.6	7.2	7.2	1.28	.105	12.2	-		-				4.9
6.8	7.3	7.4	1.12	.100	11.2	-		-				6.3
7.2	8.0	8.0	0.88	.085	10.4	-		-				11.5
7.4	8.2	8.3	0.57	.063	9.0	-		-				9.0
7.7	8.5	8.8	0.50	.055	9.1	-		-				7.0
8.2	9.0	9.1	0.31			-		8				7.8
8.1	9.0	9.2	0.20			-		5				5.7

5A1a CATION EXCHANGE CAPACITY (NH_4Ac)	EXTRACTABLE CATIONS 5B1a 6N2b Ca	6Q2b Mg	H	6P2a Na	6Q2a K	BASE SAT. %	SATURATION EXTRACT SOLUBLE Na	K	MOISTURE AT SATURATION %
	milliequivalents per 100g. soil →						← milliequivalents per liter →		
9.7	7.1	1.6		0.2	0.8				
13.8	10.7	2.1		0.2	1.2				
23.5	19.1	3.8		0.1	1.4				
20.9	16.9	3.6		0.1	1.2				
17.0		3.1		0.1	1.1				
13.6				0.1	1.1				

Soil type: Rosebud loamy very fine sand
Soil No.: S54Wyo-8-3
Location: Goshen County, Wyoming; near southeast corner of southwest quarter of Section 35, T19N, R64W.
Physiographic position: Upland.
Topography: Gentle convex slope approximately 2 percent facing east.
Drainage: Well drained.
Vegetation: Predominantly short grasses, blue grama, buffalograss with some western wheatgrass.
Use: Pasture.
Collected by: James Allen, Charles Fox, E. F. Brunkow, and A. J. Cline, August 30, 1954.
Described by: A. J. Cline.

Horizon and
Lincoln
Lab. Number

A1 ——— 0 to 3 inches. Light brownish gray (10YR 6/2 dry) to very dark grayish brown (10YR 3/2 moist) fine

[redacted]

boundary clear and smooth.

B1
2533 — 3 to 6½ inches. Dark brown to brown (7.5YR 4/3 dry) to dark brown (7.5YR 3/2 moist) heavy loam or light clay loam; hard when dry, friable when moist; moderate coarse subangular blocky structure; this horizon has a very weak tendency towards columnar structure; noncalcareous; lower boundary clear and smooth.

B21t
2534 — 6½ to 13 inches. Dark grayish brown (10YR 4/2.5 dry) to very dark grayish brown (10YR 3/2.5 moist) clay loam; very hard when dry and firm when moist; moderate medium prismatic breaking to strong medium angular blocky; noncalcareous; moderately thick well-defined clay skins; lower boundary clear and smooth.

B22t
2535 — 13 to 17 inches. Very pale brown (10YR 7/3 dry) to brown (10YR 5/3 moist) heavy very fine sandy loam or loam; slightly hard when dry, friable when moist; moderate coarse prismatic breaking to moderate coarse subangular blocky; noncalcareous; a few thin patchy clay skins; lower boundary clear and smooth.

B3ca
2536 — 17 to 21 inches. Very pale brown (10YR 7/3.5 dry) to pale brown (10YR 6/3 moist) fine sandy loam; slightly hard when dry, friable when moist; weak coarse subangular blocky structure; calcareous; the horizon has a few small calcium carbonate concretions; lower boundary abrupt and smooth.

C1ca
2537 — 21 to 30 inches. Very pale brown (10YR 8/3 dry) to 10 YR 7/3 moist fine sandy loam; slightly hard when dry, friable when moist; massive; calcareous; the horizon contains large amounts of accumulated lime principally as lime flour but with a few concretions; lower boundary is gradual and smooth.

C2ca
2538 — 30 to 41 inches. Very pale brown (10YR 8/3 dry) to 10YR 7/3 moist light fine sandy loam; slightly hard when dry, friable when moist; massive; calcareous; the horizon contains moderate amounts of calcium carbonate chiefly as lime flour but with an occasional calcium carbonate concretion; this horizon

SOIL SURVEY LABORATORY Mandan, North Dakota 9-8-55

SOIL TYPE Stoneham very fine sandy loam **LOCATION** Goshen County, Wyoming

SOIL NOS. S54Wyo-8-1 **LAB. NOS.** 2520-2525

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1									2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 <19mm	
0-2	A1	0.6a	1.2a	0.8	10.2	57.5	18.1	11.6	77.2	5.8	--	vfsl
2-5	B1	0.3a	0.8a	1.1	10.9	57.8	14.3	14.8	75.4	4.6	--	vfsl
5-9½	B2t	0.3a	0.6	2.0	17.4	46.5	12.4	20.8	65.9	5.2	--	scl
9½-13½	B3	0.1a	0.5	3.0	23.4	36.4	17.3	19.3	60.5	8.4	--	vfsl
13½-34	C1ca	-	0.4	3.0	21.9	39.7	17.7	17.3	63.7	8.2	--	vfsl

33

Soil type: Stoneham very fine sandy loam
Soil No.: S54Wyo-8-1
Location: Goshen County, Wyoming; 800 feet east and 60 feet south of road junction in northwest corner of northeast quarter of section, 27N, R61W.
Physiographic position: Upland.
Topography: Strongly rolling area, convex slope 6 percent.
Drainage: Well drained.
Vegetation: About 80 percent ground cover, dominantly threadleaf sedge, blue grama, and scattered pricklypear.
Use: Pasture. Described by: A. J. Cline.
Collected by: James Allen, Charles Fox, E. F. Brunkow, and A. J. Cline, August 30, 1954.

Horizon and Lincoln Lab. No.	
A1 2520	0 to 2 inches. Grayish brown (10YR 5/2 dry) to dark grayish brown (10YR 4/2 moist) very fine sandy loam; loose when dry and very friable when moist; weak fine crumb structure; noncalcareous; plant roots numerous; lower boundary abrupt and smooth.
B1 2521	2 to 5 inches. Brown (10YR 5/3 dry) to dark grayish brown (10YR 4/2 moist) fine sandy loam; soft when dry and very friable when moist; weak fine granular structure; noncalcareous; numerous plant roots; lower boundary clear and smooth.
B2t 2522	5 to 9½ inches. Brown (10YR 5/3 dry) to dark brown (10YR 4/3 moist) light sandy clay loam; hard when dry and plastic when wet; pores few and very fine; numerous plant roots; thin but definite clay skins; moderate medium prismatic structure breaking to moderate medium angular blocky that crush to fine granular; noncalcareous; lower boundary clear and smooth.
B3 2523	9½ to 13½ inches. Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist) light fine sandy clay loam; slightly hard when dry, slightly plastic when wet; weak coarse prismatic structure breaking to weak angular blocky; noncalcareous; few small faint brown mottles with gray rings; numerous plant roots; lower boundary gradual and irregular.
C1ca 2524	13½ to 34 inches. Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist) very fine sandy loam; slightly hard when dry, friable when moist; very weak coarse prismatic breaking to very weak coarse subangular blocky; strongly calcareous; accumulated calcium carbonate as lime flour and as concretions; several krotovinas in pit; lower boundary diffuse and smooth.
C2ca 2525	34 to 55 inches. Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist) very fine sandy loam; hard when dry, very friable when moist; massive; pores few and fine; moderately calcareous; contains less lime than horizon above.

SOIL SURVEY LABORATORY Mandan, N. Dak.

SOIL TYPE Terry very fine sandy loam **LOCATION** Goshen County, Wyoming

SOIL NOS. S53Wyo-8-8 **LAB. NOS.** 1926-1931

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1									2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2	
0-5	A1	0.8	0.5	0.7	31.7	45.0	11.3	10.0	75.0	3.5	-	vfsl
5-8	AB	-	0.8	0.7	34.2	42.2	9.8	12.3	73.4	2.5	-	vfsl
8-14	B21	0.3	0.2	0.6	35.8	40.3	9.1	13.7	71.8	2.2	-	vfsl
14-21	B22	-	0.4	0.6	37.0	43.0	8.3	10.7	74.9	2.0	-	vfsl
21-28	B3	0.4	0.3	0.8	37.1	43.8	9.5	8.1	76.3	2.4	-	lfs
28-42	C1	0.7	0.4	0.8	39.9	42.1	9.7	6.4	77.1	1.9	-	lfs

ORGANIC MATTER 8A2 ELECTRL 6E1a 6E1a MOISTURE TENSIONS

Soil type: Terry very fine sandy loam
Soil No.: S53Wyo-8-8
Location: Goshen County, Wyoming; 0.23 mile east of northwest corner of Section 23, T29N, R61W and 75 feet south of road.
Vegetation: Permanent pasture; dominantly needle-and-thread, some sand dropseed, Indian rice grass and blue grama; about 40 percent cover.
Slope: 3 percent upland; convex, faces north; well drained.
Parent material: Eolian sands over Miocene sandstone.
Described by: C. J. Fox, September 29, 1953.

Horizon and Mandan Lab. Number	
A1 1926	0 to 5 inches. Brown (10YR 5/3 dry) or very dark grayish brown (10YR 3/2 moist) noncalcareous very friable coarse weak platy very fine sandy loam that crushes to single grains; surface 1/4-inch a soft crust; grass roots abundant; abrupt smooth boundary.
AB 1927	5 to 8 inches. Brown (10YR 5/3 dry) or dark grayish brown (10YR 4/2 moist) noncalcareous friable coarse and very coarse weak prismatic blocky very fine sandy loam; hard when dry; crushes to fine weak granules and single grains; grass roots plentiful; clear smooth boundary.
B21 1928	8 to 14 inches. Brown (10YR 5/3.5 dry) or dark brown (10YR 4/3 moist) noncalcareous friable coarse to very coarse moderately developed prismatic medium blocky heavy very fine sandy loam; hard when dry; crushes to very fine weak granules and single grains; roots plentiful; gradual smooth boundary.
B22 1929	14 to 21 inches. Brown (10YR 5/3 dry) or dark brown (10YR 4/3 moist) noncalcareous friable weak very coarse prismatic blocky very fine sandy loam that crushes to weak fine granules and single grains; hard when dry; roots plentiful; gradual wavy boundary.
B3 1930	21 to 28 inches. Brown (10YR 5/3 dry) or dark brown (10YR 4/3 moist) noncalcareous very friable very coarse weak prismatic heavy loamy very fine sand that crushes to very fine weak granules and single grains; many fine roots; diffuse wavy boundary.
C1 1931	28 to 42 inches. Pale brown (10YR 6/3 dry) or brown (10YR 4.2/3 moist) noncalcareous soft massive loamy very fine sand that crushes to single grains; weakly calcareous surrounding an occasional rock fragment; abrupt irregular boundary.
Dr	42 inches plus. (Not sampled.) Calcareous sandstone which probably belongs to the Monroe Creek formation.

SOIL SURVEY LABORATORY Mandan, N. Dak.

SOIL TYPE Terry loamy very fine sand **LOCATION** Goshen County, Wyoming

SOIL NOS. S53Wyo-8-9 **LAB. NOS.** 1932-1938

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1									2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2	

Soil type: Terry loamy very fine sand
Soil No.: S53Wyo-8-9
Location: Goshen County, Wyoming; 115 feet west and 145 feet south of east quarter corner of Section 22, T28N, R61W.
Vegetation: Permanent pasture; dominantly grama and niggerwool (Carex filifolia).
Slope: 4 percent upland; slightly convex, faces northeast; well drained.
Parent material: Eolian, calcareous loamy very fine sand overlying Miocene sandstone.
Note: Profile contained several krotovinas.
Described by: C. J. Fox, October 1953.

Horizon and Mandan Lab. Number	
A11 1932	0 to 3 inches. Brown (10YR 5/3 dry) to dark brown (10YR 4/3 moist) noncalcareous very friable single grain loamy very fine sand; loose when dry; very friable 1/8-inch crust on surface; abrupt smooth boundary.
A12 1933	3 to 6 inches. Brown (10YR 5/3 dry) or dark brown (10YR 4/3 moist) noncalcareous friable weak coarse prismatic blocky very fine sand that crushes to weak fine granules and single grains; hard when dry; roots plentiful; clear smooth boundary.
B2 1934	6 to 14 inches. Brown (10YR 5/3 dry) or dark brown (10YR 4/2.5 moist) noncalcareous friable moderately developed medium prismatic blocky very fine sandy loam; hard when dry; roots plentiful; clear smooth boundary.
B3 1935	14 to 21 inches. Brown (10YR 5/3 dry) or dark brown (10YR 4/3 moist) noncalcareous friable coarse weak prismatic heavy loamy very fine sand; soil breaks into weak medium angular blocky units that crush to single grains; slightly hard when dry; roots plentiful; gradual irregular boundary.
Cca 1936	21 to 32 inches. Pale brown (10YR 6/3 dry) or brown (10YR 4/3 moist) very strongly calcareous very friable loamy very fine sand that removes in angular fragments that crush to single grains; slightly hard when dry; roots plentiful; gradual irregular boundary.
C1 1937	32 to 47 inches. Pale brown (10YR 6/3 dry) or brown (10YR 5/3 moist) strongly calcareous very friable loamy very fine sand that removes in slightly hard angular fragments that crush to single grains; roots few; gradual irregular boundary.
C2 1938	47 to 61 inches. Pale brown (10YR 6/3 dry) or brown (10YR 5/3 moist) strongly calcareous single grained loamy very fine sand; abrupt irregular boundary.
D	61 inches plus. (Not sampled.) A mixture of weathered sandstone and lime concretions.

SOIL SURVEY LABORATORY Mandan, North Dakota 9/19/55

SOIL TYPE Ulm loam **LOCATION** Campbell County, Wyoming

SOIL NOS. S54Wyo-3-3 **LAB. NOS.** 2464-2471

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2 (<19mm)	TEXTURE CLASS
0-3	A1	0.4	0.4	0.6	12.9	28.8	39.5	17.4	59.9	19.3	-	1
3-5½	B1	0.2	0.2	0.3	12.4	26.1	29.1	31.7	51.0	15.0	-	cl
5½-10	B21t	0.1	0.2	0.2	10.4	24.0	29.5	35.6	47.4	15.3	-	cl
10-15	B22t	0.9	0.4	0.2	6.7	17.3	37.6	36.9	36.5	24.1	1	cl
15-24	B3ca	0.3	0.4	0.4	9.0	21.7	36.0	32.2	40.0	25.5	-	cl
24-35	C1ca	0.8	0.5	0.3	7.1	23.1	38.3	29.9	45.3	22.2	1	cl
35-45	C2ca	0.6	0.4	0.3	4.8	17.3	43.7	32.9	37.7	27.3	-	cl
45-53+	R	-	0.2	0.2	3.9	15.2	46.5	34.0	36.7	28.4	-	cl

	pH		ORGANIC MATTER			8A2	ELECTRICAL CONDUCTIVITY	6E1a		MOISTURE TENSION		
8C1b SATURATED PASTE	8C1a 1:5	8C1a 1:10	6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	EST% SALT (BUREAU CUP)	EC×10³ MILLIMHOS PER CM 8A1a	$CaCO_3$ equivalent %	GYPSUM me./100g. SOIL	1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
6.4	6.7	6.8	1.27	.116	10.9	-	0.4	-				6.3
6.5	6.9	6.8	1.12	.114	9.8	-	0.4	1				11.3
7.3	7.5	7.3	0.90	.100	9.0	-	0.6	1				13.4
7.9	8.4	8.5	0.87	.098	8.9	-	0.6	10				14.2
8.0	8.8	8.8	0.52	.060	8.7	-	0.5	11				12.0
8.3	9.4	9.5	0.26			-	0.9	9				10.6
8.4	9.5	9.7	0.24			-	2.2	8				12.3
8.5	9.5	9.7	0.24			-	3.4	7				13.5

5A1a	EXTRACTABLE CATIONS 5B1a					5D2	8A1 SATURATION EXTRACT SOLUBLE				8A
CATION EXCHANGE CAPACITY (NH_4Ac)	6N2b Ca	6O2b Mg	H	6P2a Na	6Q2a K	EXCH. Na %	6P1a Na	6Q1a K			MOISTURE AT SATURATION %
← milliequivalents per 100g. soil →							← milliequivalents per liter →				
12.7	7.7	3.1		-	0.8	-	0.4	0.6			35.7
22.3	14.5	5.6		0.1	0.6	-	0.4	0.1			44.6
26.0	20.0	6.8		0.1	0.5	-	0.6	0.1			55.7
23.9				0.1	0.2	-	0.6	0.1			57.0
20.6				0.4	0.2	1	2.2	0.1			49.5
19.4				1.7	0.1	7	6.9	0.1			45.8
22.0				4.6	0.1	15	19.7	0.1			58.8
22.8				6.2	0.1	18	32.0	0.1			63.6

Soil type: Tlm loam
Soil No.: S54Wyo-3-3
Location: Campbell County, Wyoming; northwest quarter of southeast quarter of Section 11, T43N, R73W
Physiographic position: Upland.
Topography: Slightly concave slope of approximately 4 percent facing southeast.
Drainage: Well drained.
Vegetation: Mainly blue grama and buffalograss, some needlegrass and sage.
Use: Pasture.
Collected by: L. T. Alexander, James Allen, Harold Bindschadler, and A. J. Cline, August 16, 1954.
Described by: A. J. Cline.

Horizon and Lincoln Lab. Number	
A1 2464	0 to 3 inches. Light brownish gray (10YR 6/2 dry) to dark grayish brown (10YR 4/2 moist) loam; soft, dry; very friable, moist; moderate fine platy breaking to moderate fine granular; noncalcareous; the horizon is slightly lighter-colored in the lower 1/2-inch; lower boundary clear and smooth.
B1 2465	3 to 5½ inches. Dark grayish brown (10YR 4/2.5 dry) to dark brown (10YR 3/3 moist) light clay loam; slightly hard, dry; friable, moist; weak medium subangular blocky; noncalcareous; aggregates have a weak coating of 10YR 8/2 in the upper portion of this horizon; there are a few very weak and patchy clay skins in the lower part; lower boundary clear and smooth.
B21t 2466	5½ to 10 inches. Yellowish brown (10YR 5/4 dry) to dark yellowish brown (10YR 4/4 moist) clay loam; hard, dry; firm, moist; strong medium prismatic breaking to strong medium angular blocky; noncalcareous; moderately thick prominent clay skins; lower boundary abrupt and smooth.
B22t 2467	10 to 15 inches. Pale brown (10YR 6/3 dry) to brown (10YR 5/3 moist) clay loam; hard, dry; firm, moist; moderate medium prismatic breaking to moderate medium angular blocky; calcareous; few indistinct clay skins; lower boundary clear and smooth.
B3ca 2468	15 to 24 inches. Light yellowish brown (2.5Y 6/3 dry) to light olive brown (2.5Y 5/4 moist) light clay loam; very hard, dry; firm, moist; weak coarse prismatic breaking to weak coarse angular blocky; calcareous; a few small concretions of calcium carbonate; lower boundary gradual and smooth.
C1ca 2469	24 to 35 inches. Pale olive (5Y 6/3 dry) to olive (5Y 5/3 moist) heavy loam; very hard, dry; firm, moist; massive to very weak coarse subangular blocky structure; calcareous; much accumulated calcium carbonate principally as lime flour but containing some concretionary and myceliated forms; a few small faint 2.5Y 5/6 mottles; lower boundary gradual and smooth.
C2ca	35 to 45 inches. Pale olive (5Y 6/3 dry) to olive (5Y 5/3 moist) loam; hard, dry; friable, moist; [redacted] 5Y 5/6 mottles; lower boundary gradual and smooth.
R 2471	45 to 53 inches plus. Pale olive (5Y 6/3.5 dry) to olive (5Y 5/3.5 moist) loam; hard, dry; friable, moist; massive; calcareous; a few small faint 5Y 5/6 mottles; this is a horizon of partially disintegrated very weakly indurated siltstone, loamstone, and sandstone of the Fort Union formation.

SOIL SURVEY LABORATORY Mandan, North Dakota 9/19/55

SOIL TYPE Ulm loam **LOCATION** Campbell County, Wyoming

SOIL NOS. 854Wyo-3-4 **LAB. NOS.** 2472-2478

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2 <19mm	TEXTURAL CLASS
0-4½	A1	0.4	1.7	3.4	18.4	22.0	38.1	16.0	53.1	19.9	-	l
4½-8	B1	0.2	0.9	2.1	14.7	21.2	34.8	26.1	48.3	18.4	-	l
8-15	B21t	0.1	0.8	1.8	13.9	19.3	31.3	32.8	45.6	15.2	-	cl
15-22	B22t	-	0.4	1.2	11.9	18.3	32.7	35.5	41.2	18.6	-	cl
22-27	B3ca	0.5	0.5	0.7	9.6	17.9	37.4	33.4	40.1	22.6	-	cl
27-38	C1ca	1.2	0.5	0.8	12.0	18.0	36.0	31.5	41.0	22.3	-	cl
38/	C2ca	0.2	0.4	0.8	8.0	14.8	42.1	33.7	37.5	25.8	-	cl

	pH		ORGANIC MATTER			8A2	ELECTRICAL CONDUCTIVITY	6E1a		MOISTURE TENSIONS		
8C1b SATURATED PASTE	8C1a 1:5	8C1a 1:10	6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	EST% SALT (BUREAU CUP)	EC x 10³ MILLIMHOS PER CM 8A1a	$CaCO_3$ equivalent %	GYPSUM me./100g. SOIL	1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
6.2	6.7	6.7	1.26	.116	10.9	-	0.5	-				6.1
6.4	6.8	6.8	0.86	.089	9.7	-	0.6	1				8.8
6.6	7.2	7.0	0.68	.074	9.2	-	0.4	-				12.0
7.3	7.8	7.6	0.61	.069	8.8	-	0.4	1				13.3
7.9	8.8	8.8	0.50	.060	8.3	-	0.5	4				12.4
8.1	8.8	8.9	0.38			-	0.5	6				11.2
8.1	9.0	9.0	0.36			-	0.7	6				12.4

5A1a	EXTRACTABLE CATIONS 5B1a					5D2	SATURATION EXTRACT SOLUBLE 8A1					8A
CATION EXCHANGE CAPACITY (NH_4Ac)	6N2b Ca	6O2b Mg	H	6P2a Na	6Q2a K	EXCH. Na %	6P1a Na	6Q1a K				MOISTURE AT SATURATION %
← milliequivalents per 100g. soil →							← milliequivalents per liter →					
12.2	6.7	3.0		0.1	0.8	1	0.4	0.7				36.8
17.3	10.2	5.3		-	0.5	-	0.6	0.2				40.2
23.3	13.4	8.0		0.1	0.6	-	0.4	0.1				47.7
27.5	16.3	11.8		0.1	0.4	-	0.7	0.1				53.1
24.6				0.3	0.2	-	0.9	0.1				50.(
22.2				0.4	0.2	1	1.8	0.1				48.0
23.6				0.7	0.2	2	3.2	0.1				51.1

Soil type: Ulm loam
Soil No.: S54Wyo-3-4
Location: Campbell County, Wyoming; northeast quarter of southeast quarter of Section 8, T42N, R74W, 2 miles east of Pinetree, Wyoming.
Physiographic position: Upland.
Topography: Slightly convex slope of approximately 3 percent facing east.
Drainage: Well drained.
Vegetation: Short grasses, chiefly blue grama and buffalograss, sage, needlegrass, and occasional cactus.
Use: Pasture.
Collected by: L. T. Alexander, James Allen, Harold Bindschadler, and A. J. Cline, August 16, 1954.
Described by: A. J. Cline.

Horizon and Lincoln Lab. Number	
A1 2472	0 to 4½ inches. Light brownish gray (10YR 6/2.5 dry) to dark grayish brown (10YR 4/2 moist) light loam; soft, dry; very friable, moist; weak fine platy breaking to moderate very fine granular; noncalcareous; lower boundary clear and smooth.
B1 2473	4½ to 8 inches. Grayish brown (10YR 5/2.5 dry) to very dark grayish brown (10YR 3.5/2 moist) light clay loam; slightly hard, dry; friable, moist; weak to moderate medium subangular blocky structure; noncalcareous; lower boundary clear and smooth.
B21t 2474	8 to 15 inches. Brown (10YR 5/3 dry, 10YR 4/3 moist) clay loam; hard, dry; firm, moist; strong medium prismatic breaking to strong medium angular blocky; noncalcareous; moderately thick prominent clay skins; lower boundary gradual and smooth.
B22t 2475	15 to 22 inches. Light olive brown (2.5Y 5/3 dry) to olive brown (2.5Y 4/3 moist) clay loam; very hard, dry; firm, moist; strong medium prismatic breaking to strong medium angular blocky; noncalcareous; moderately thick prominent clay skins; lower boundary abrupt and smooth.
B3ca 2476	22 to 27 inches. Olive (5Y 5.5/3 dry, 5Y 4.5/3 moist) light clay loam; hard, dry; firm, moist; moderate medium angular blocky structure; calcareous; the horizon contains a few small concretions of calcium carbonate; lower boundary gradual and smooth.
C1ca 2477	27 to 38 inches. Pale olive (5Y 6/3 dry) to olive (5Y 5/3 moist) heavy loam; hard, dry; firm, moist; massive to weak coarse subangular blocky; calcareous; moderate amounts of accumulated calcium carbonate chiefly as lime flour but containing a few small concretions and mycelia; lower boundary gradual and smooth.
C2ca 2478	38 inches plus. Pale olive (5Y 6/3 dry) to olive (5Y 5/3 moist) heavy loam; hard, dry; firm, moist; massive; calcareous; grades to weakly indurated and only slightly weathered loamstone, siltstone, and [illegible]

SOIL SURVEY LABORATORY Mandan, N. Dak.

SOIL TYPE Valentine loamy fine sand **LOCATION** Goshen County, Wyoming

SOIL NOS. S50Wyo-8-6 **LAB. NOS.** 541-546

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2 (<19mm)	TEXTURAL CLASS
0-3	A11	-	1.2	2.1	17.0	45.0	24.3	10.4	75.8	4.8	-	vfsl
3-12	A12	1.2	2.8	5.1	43.3	25.4	13.3	8.9	62.0	3.0	2	lfs
12-32	C1	0.8	2.2	6.9	63.6	14.2	4.7	7.6	53.3	1.7	1	fs
32-49	C2	1.1	4.4	9.9	69.8	9.1	1.7	4.0	45.9	1.0	3	fs
49-55	C3	14.0	6.7	4.6	47.6	16.6	4.8	5.7	51.2	1.4	44	s
a		0.8	2.7	5.3	45.4	25.1	12.1	8.6	63.5	3.4	1	fsl

	pH		ORGANIC MATTER			8A2	ELECTRICAL CONDUCTIVITY	6E1a	6F1a	MOISTURE TENSIONS		
8C1b SATURATED PASTE	8C1a 1:5	8C1a 1:10	6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	EST% SALT (BUREAU CUP)	EC x 10³ MILLIMHOS PER CM 8A1a	$CaCO_3$ equivalent %	GYPSUM me./100g. SOIL	4B1a 1/10 ATMOS. %	1/3 ATMOS. %	4B2 15 ATMOS. %
6.6	7.2	7.4	0.91	.083	11.0	-	0.4	-	-	32.4		6.5
7.0	7.6	7.7	0.46	.047	9.8	-	0.4	-	-	17.9		4.8
7.5	8.1	8.1	0.29	.027	10.7	-	0.4	-	-	10.8		4.2
8.0	8.8	8.8	0.09	.010		-	0.3	-	-	6.6		2.4
8.0	9.0	9.0	0.09	.012		-	0.4	-	-	9.1		3.2
7.7	8.2	8.5	0.68	.067	10.1	-	0.5	-	-	17.0		4.6

5A1a	5B1a CATIONS			5B1b	5D2	8A1 SATURATION EXTRACT SOLUBLE		8A
	EXTRACTABLE			EXCHANGEABLE				
CATION EXCHANGE CAPACITY NH_4OAc	6N2b Ca	6O2b Mg	H	6P2a Na	6Q2a K	EXCH. Na %	6P1a Na	6Q1a K	MOISTURE AT SATURATION %
← milliequivalents per 100g. soil →							← milliequivalents per liter →		

Soil type: Valentine loamy fine sand
Soil No.: S50Wyo-8-6
Location: Southwest quarter of northwest quarter of northwest quarter of Section 28, T25N, R61W, Goshen County, Wyo.
Vegetation: Virgin pasture; sparse cover of blue grama and needlegrasses, sagebrush and cactus.
Physiography: Nearly level high terrace.
Described by: W. M. Johnson.

Horizon and Mandan Lab. Number

A11 541 — 0 to 3 inches. Grayish brown (10YR 5/2 dry) to dark grayish brown (10YR 4/2 moist) soft, very friable, heavy loamy fine sand; weak fine subangular blocks crush easily to weak coarse and medium granules; noncalcareous; clear boundary.

A12 [illegible] — 3 to 12 inches. Grayish brown (10YR 5/2.5 dry) to dark grayish brown (10YR 4/2 moist) weak prismatic, [illegible] friable, heavy loamy very fine sand that breaks to weak blocks; noncalcareous; few roots; gradual boundary.

C1 543 — 12 to 32 inches. Brown (10YR 5/3 dry) to dark brown (10YR 4/3 moist) soft, very friable, very weak prismatic loamy fine sand; noncalcareous; few roots; gradual boundary.

C2 544 — 32 to 49 inches. Pale brown (10YR 6/3 dry) to brown (10YR 5/2.5 moist) slightly coherent loamy fine sand; calcareous; very few roots; gradual boundary.

C3 545 — 49 to 55 inches. Pale brown (10YR 6/2.5 dry) to brown (10YR 5/2.5 moist) loose gravelly loamy fine sand; mildly calcareous.

SOIL SURVEY LABORATORY Lincoln, Nebr. April, 1963

SOIL TYPE Vasquez loam **LOCATION** Park County, Wyoming

SOIL NOS. S61Wyo-15-3 **LAB. NOS.** 15766-15773

DEPTH INCHES	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1									2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 <19mm	
3-0	O	a	a	a	a	a	a	a	a	a	Tr.	
0-4	A11g	10.5	16.6	12.7	25.0b	7.8b	18.5	8.9	26.8	11.5	Tr.	cosl
4-9	A12g	8.6	13.4	10.8	22.7b	9.4b	27.1	8.0	32.0	15.9	10	sl
9-17	B21irg	21.4	20.2	13.0	21.7b	6.9b	11.6	5.2	22.2	6.4	21	lcos
17-29	B22g	8.4	14.2	9.5	16.9	7.5b	28.9	14.6	27.1	17.3	19	sl
29-43	B23g	9.5	13.0	8.3	14.3	7.1b	31.5	16.3	25.0	20.6	7	sl/l
43-52	B24g	11.9	13.5	8.2	13.8	6.5	28.2	17.9	22.8	18.6	16	cosl
52-57	B25g	10.0	12.5	7.7	14.3	7.4	30.1	18.0	24.9	19.7	14	l/sl

[redacted]

Soil type: Vasquez loam
Soil No.: S61Wyo-15-3
Location: Park County, Wyoming; Deep Lake Quadrangle USGS, 15 min. series, topographic; 400 feet north of benchmark, elevation 10,536 feet, Cooke City Highway. The benchmark is one-half mile north of Gardner Lake near Gardner Headwall on the highway; pit is near south edge of a small lake. The area is unsurveyed.
Physiography: Flat-bottomed head of a blocked drainage. The valley bottom is 800 feet across with a small lake in the center; profile sampled on marshy shore of lake. The western valley side is a barren area of usual snow accumulation; eastern valley side is a steep rocky grassed mountain slope, characterized by a series of small solifluction terraces on the milder lower slopes and rocky polygon nets and rock stripes extending from the foot of the very steep slopes of the valley side to the rock outcrop at the top. The shore of the lake is a strongly hummocked marsh; hummocks are about 2 to 4 feet across, 10 to 15 inches high, and above narrow (1 to 2 feet across) continuous intervening barren lows.
Parent material: Local alluvium mantled with a layer of plant remains.
Vegetation: Hairgrass, sedges and moss.
Drainage: Very poor; ground water stands about 15 inches below the top of the mounds. Water was bucketed from the bottom of the hole as the pit was dug to permit sampling of the soil horizons above the water.
Temperature: 45 degrees F. at 33 inches; 42 degrees F. at 55 inches.
Sampled by: R. C. McConnell, T. J. Nimlos, R. Taber, and C. A. Mogen, August 25, 1961.

Horizon and Lincoln Lab. Number	
O 15766	3 to 0 inches. Dark reddish brown (5YR 2/2, dry or moist) fibrous peat; abundant roots.
A11g 15767	0 to 4 inches. Mottled black and very dark brown (2.5Y 2/2 and 7.5YR 2/2 moist) in large pattern fine sandy loam, 10YR 5/1 dry with many large mottlings of 5YR 4/6 of plant fibers and soil; massive structure; hard, nonsticky and nonplastic; very dark brown mottling is largely associated with concentration of roots;

SOIL SURVEY LABORATORY Lincoln, Nebr. April, 1963

SOIL TYPE Vasquez clay loam **LOCATION** Park County, Wyoming

SOIL NOS. S61Wyo-15-4 **LAB. NOS.** 15774-15778

DEPTH IN CMS.	HORIZON	1B1a PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1									2A2	TEXTURAL
		VERY COARSE	COARSE	MEDIUM	FINE	VERY FINE						

Soil type: Vasquez clay loam
Soil No.: 961Wyo-15-4
Location: Park County, Wyoming; Mount Maurice Quadrangle, 15 min. series, topographic; 1,320 feet south of milepost 82, elevation 10,073 feet, on the state line between Montana and Wyoming; the milepost is about 1,320 feet east of the Cooke City Highway were it crosses the state line. The area is unsurveyed.
Physiography: Sample was taken on the gently sloping western edge of a 600-foot wide, 1/2-mile long, hanging valley in the Boundary Lakes area of the Beartooth Plateau; profile was exposed in the edge of a 6-foot wide hummock on the edge of a 3-foot high terrace that has a 4-percent slope from the west edge of the valley and a 13-percent slope northeast down the terrace slope. An open pool of water, 75 feet to the west, is at the very edge of the valley floor adjoining the very stony foot of the valley wall. Water runs east in a stream 50 feet north of the sample site and the ground water moves through the soil just below the surface of the troughs surrounding the hummocks. South-southwest of the sample site the lower slopes of the valley wall are steep; this together with about 50 feet of the first terrace of the valley bottom is nearly barren of vegetation and usually is covered with snow throughout the summer months. Streams of cold water (35 degrees F.) flow out at the base of the valley wall.
Parent material: Stratified glacial deposits.
Vegetation: Willow sedge.
Temperature at 3:30 P.M.: 68 degrees F. ground level; 39 degrees at 41 inches; 35 degrees, water flowing out of base of west valley side.
Collected by: R. C. McConnell, T. J. Nimlos, R. D. Taber, and C. A. Mogen, August 25, 1961.

Horizon and Lincoln Lab. Number	
O 15774	3 to 0 inches. Dark reddish brown (5YR 3/2 and 2/2 mixed) dry or moist peat; fibrous; matted with roots; abrupt boundary.
A1 15775	0 to 4 inches. Very dark brown (7.5YR 2/2 moist) silt loam, 7.5YR 5/1 dry with many large prominent mottlings of 7.5YR 3/2 and 4/4, mostly of plant fibers; massive structure; slightly sticky and slightly plastic; abundant roots; abrupt very irregular boundary.
B21irg 15776	4 to 10 inches. Dark reddish brown (3.5YR 3/4) and dark red (2.5YR 3/6) moist gravelly loam, 5YR 4/8 centers, 7.5YR 5/8 outside of large masses with common medium distinct N 6/ mottlings; 25 percent cobbles and stones in thick horizon; dense root mat around each fragment; in places the red color is confined entirely to the root mat up to 1/4-inch thick and staining the coarse fragments; massive structure; slightly sticky and slightly plastic; abrupt very irregular and broken boundary with small patches of the horizon isolated by the horizon below contacting the A1 horizon.
B22g 15777	10 to 30 inches. Very dark gray (10YR 3/1 moist) sandy loam, 10Y 5/1 dry; massive structure; very hard, firm (brittle); nonsticky and nonplastic; abundant roots; abundant mica; occasional coarse fragment, about 30 percent coarse gravel; abrupt and very irregular boundary.
B23irg 15778	30 to 41 inches. Mottled reddish brown and dark yellowish brown with large masses of dark gray in upper part (5YR 4/4, 10YR 4/4 and 10Y 4/1) gravelly sandy loam, 10YR 6/3 when dry.

MICROMORPHOLOGY:

Grain Studies: (Method 7B1)
Quartz and feldspar dominate the very fine sand. Only a trace of volcanic ash is present. The surface is estimated to have 20 percent hornblende. Chloritic minerals in the surface are estimated at 15 to 20 percent. About 10 percent of the grains in the B horizon are opaque. Some of these are iron-oxide nodules and others are iron-coated primary minerals. Iron reduction removes the opaques and the mineral suite then resembles that of adjacent horizons. The samples change immediately from brown to gray colors when iron is removed.

* U.S. GOVERNMENT PRINTING OFFICE : 1966 O—223-987